

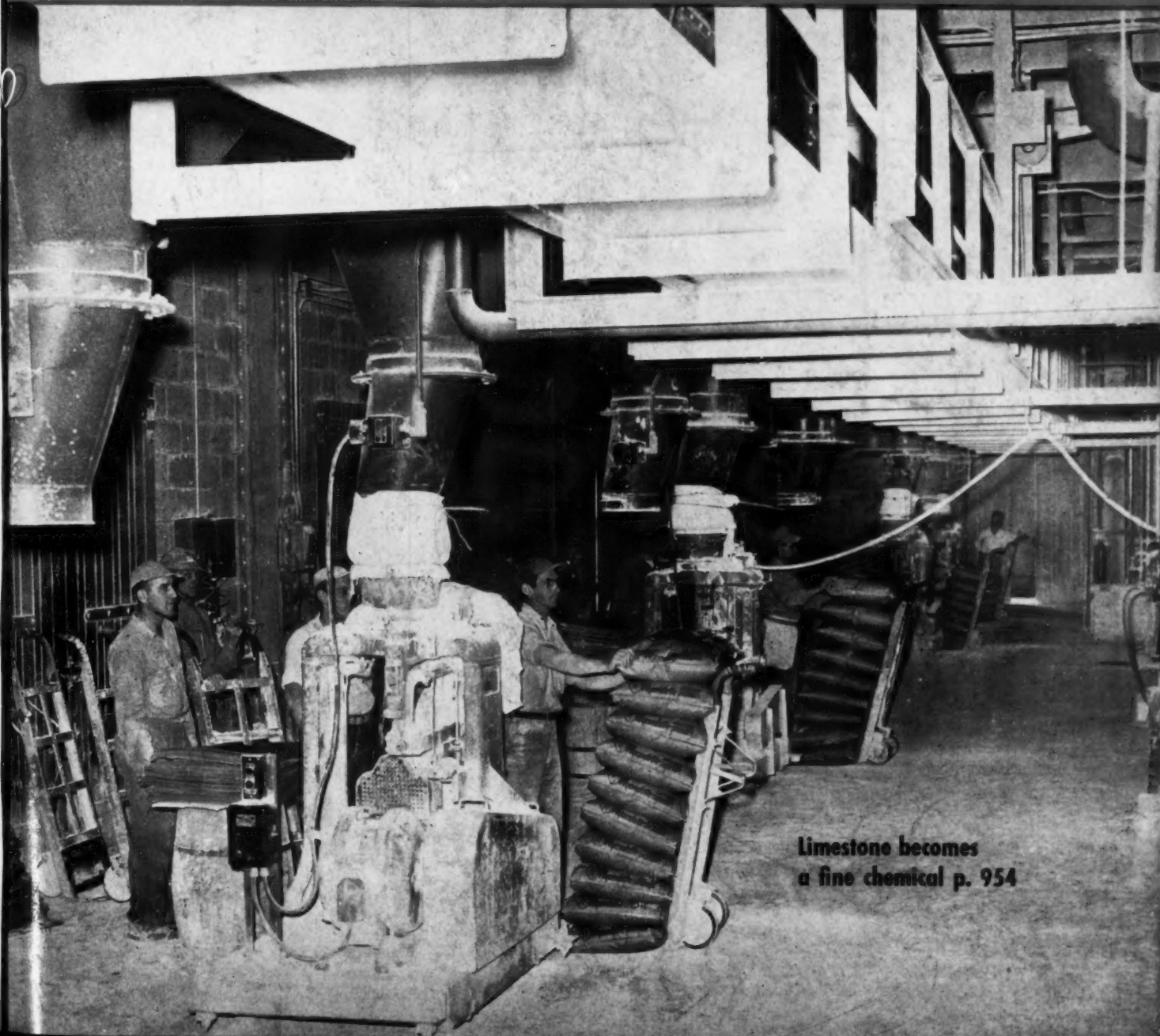
June 1947

# Chemical Industries

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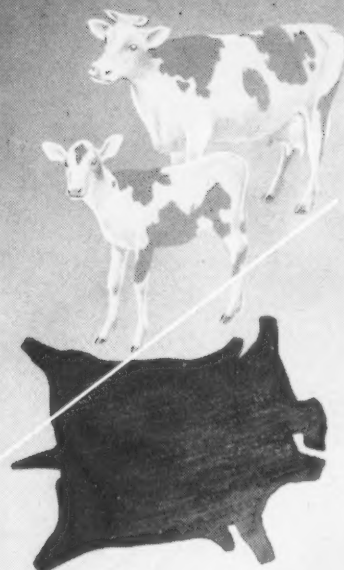
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TECHNOLOGY DEPARTMENT



Limestone becomes  
a fine chemical p. 954

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Ammonium Bicarbonate

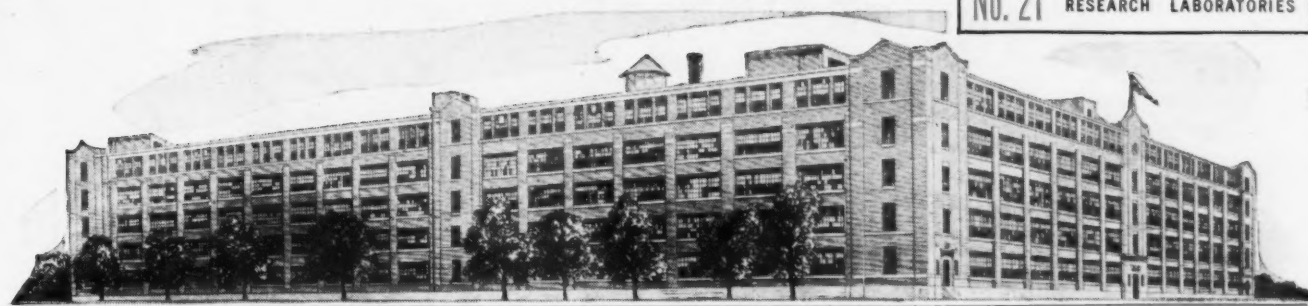
Ammonium Chloride

Tanners Alkali

Cleansing Soda XX

Sodium Sesquicarbonate





# AERO\* PHENYL BIGUANIDE HCl



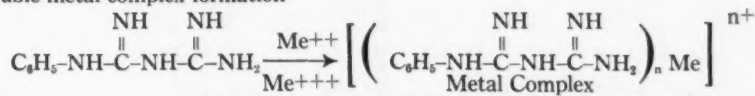
## ANTIOXIDANT—METAL DEACTIVATOR—ORGANIC INTERMEDIATE

Phenyl biguanide HCl can be readily converted to the free base which forms complex metal salts, thus acting as an efficient metal deactivator. It is valuable in organic synthesis for its ability to form heterocyclic nitrogen compounds.

### METAL DEACTIVATOR—ANTIOXIDANT

The tendency of biguanides to form metal complexes enables them to act as effective antioxidants wherever the oxidation is caused by the presence of trace amounts of metals.

Water insoluble metal complex formation

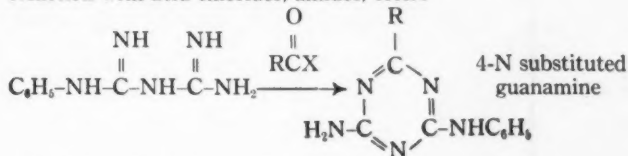


Me<sup>++</sup>, Me<sup>+++</sup> = Cu<sup>++</sup>, Ni<sup>++</sup>, Co<sup>++</sup>, Cr<sup>+++</sup>, etc.; n=2 or 3

Two salts are particularly effective for this purpose—Phenyl biguanide salt of mercaptobenzothiazole; phenyl biguanide salt of para-tertiary amyl phenyl phosphoric acid.

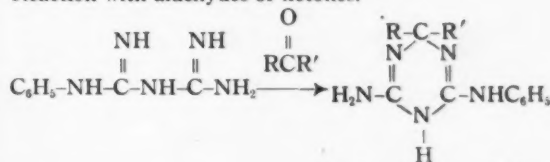
### INTERMEDIATE IN ORGANIC SYNTHESIS

Reaction with acid chlorides, amides, esters



R=H, alkyl, aryl, heterocyclic, alicyclic; X=NH<sub>2</sub>, Cl, OR'  
The amino groups of these 1, 3, 5-triazines are capable of reacting with formaldehyde.

Reaction with aldehydes or ketones.



R=alkyl, aryl, etc.  
R'=H, alkyl, aryl, etc.

### PHYSICAL PROPERTIES OF PHENYL BIGUANIDE HCl

White solid	Solubility
Molecular weight ..... 213.5	Water—sol. hot; insol. cold
Melting point ..... 237°C	Ethanol—insol.; Isopropanol—insol.
	Acetone—insol.

Free phenyl biguanide is a strong base, a little less basic than guanidine but more basic than ethanolamine.

Phenyl biguanide HCl is available in research quantities. However, your research may indicate a need for other aryl substituents in the biguanide molecule. Your inquiries regarding such modified compounds will be welcomed. We suggest that you return the coupon to us to obtain a research sample of phenyl biguanide HCl and a data sheet summarizing the chemical and physical properties of the aryl biguanides.

\*Trade-mark

## SAMPLE AND TECHNICAL DATA

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**Cyanamid**  
COMPANY  
Industrial Chemicals Division



Headquarters For Nitrogen Chemicals

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Section ON, Synthetic Organic Chemicals Dept.  
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# Chemical Industries

THE CHEMICAL BUSINESS MAGAZINE

VOLUME 60—NUMBER 6 JUNE, 1947

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Cover: Courtesy of Wyandotte Chemical Co.



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# THE READER WRITES

## *Most Intelligent*

*To the Editor of Chemical Industries:*

I have just had the pleasure of reading the article, "How to Select Safety Flooring for Chemical Plants" in the March issue of *CHEMICAL INDUSTRIES*. This is certainly the most intelligent article I have read on this subject.

Of special interest is the excellent treatment given to the points discussed under the caption, "How Far Should It Extend?" These are the questions most frequently asked by people who are interested in non-sparking, electrically conductive floors. Also the 19 point check list of questions to ask in selecting safety flooring appears to cover completely not only the chemical industry, but in addition those other industries and operations where similar protection against fire and explosion hazards caused by struck sparks and accumulated static charges is necessary.

Anyone who reads this article will certainly obtain a clear understanding of the significance and importance of safe flooring.

B. R. Wood  
The Master Builders Co.  
Cleveland, Ohio

*To the Editor of Chemical Industries:*

Your article on "How to Select Safety Flooring for a Chemical Plant" certainly has created a lot of interest.

P. D. GEPHART, Manager  
Technical Products Dept.  
H. H. Robertson Co.  
Pittsburgh, Pa.

## *Conscientious Objectors*

*To the Editor of Chemical Industries:*

I read "For Bosses Only" in your January issue with a good deal of amusement and interest.

It is true that most large industries agree with the general principles laid down in the forepart of the article. What bothers me with most articles of this type is the "beware of" section. It does not seem to me that this section is well balanced because, of the fourteen points emphasized, a number of them are obviously beyond the pale; that is, no real executive or gentleman would ever be part or parcel to such machinations.

On the other hand being only human, occasionally they might be sarcastic, show off from time to time, and I don't doubt practically all of them are tiresome more

or less frequently. If bosses lived up to all the requirements set forth by the scribes, they would be very insipid people and I wonder what force or drive there would be in such organizations. Let us admit at the beginning that we are not machines nor are we subject to the controls and checks that are applied to an inanimate thing like an engine. Sometimes certain limitations in an executive are offset by other and more important attributes.

RESEARCH DIRECTOR

*To the Editor of Chemical Industries:*

Being a good subscriber to your excellent magazine, I have read the article, "For Bosses Only." With much of what it says I am in sympathy. However, I would like to quarrel with the statement made on the first page in the third column, where it says that it takes six years for a technical man to reach the wage rates for hourly workers. Maybe it does in some men's plants, but it doesn't in ours and I know at least one other company where it doesn't either. In both cases the starting rate for a B.S. fresh from college with no experience, in the Army or elsewhere, is just about the average of the hourly workers pay. Since it is the usual habit to give these young fellows a raise at least after the first six months, it certainly doesn't take them any six years to attain the same position as hourly workers.

F. J. CURTIS, Vice President  
Monsanto Chemical Co.  
St. Louis, Mo.

*To the Editor of Chemical Industries:*

Ernest May's article "For Bosses Only" is in my opinion one of the best ever written on this delicate subject. The author not only covers the subject but presents his thoughts in clear language without hurting anyone's feelings.

WALTER VON PECHMANN  
Crestmont Laboratories  
Binghamton, N. Y.

## *Use of Pilot Plants*

*To the Editor of Chemical Industries:*

The editorial staff report "What Pilot Plants Are For" in the April issue is short and quite pertinent. I am glad to see it and hope it gets a good deal of attention.

M. H. BAKER  
Davison Chemical Corp.  
Baltimore, Md.

## *Wage Rate Correction*

In the footnote on the first page of the article "Hourly Wages in the Chemical Industry" in the April issue, the average increase in wages between January and November 1946 was inadvertently quoted as 17 per cent. This should have read "roughly 10 per cent."

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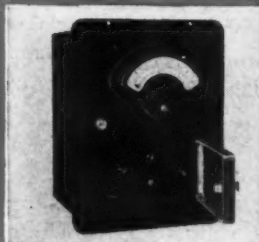
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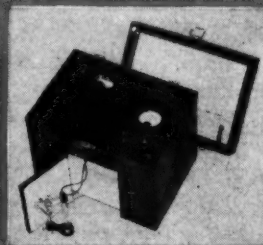


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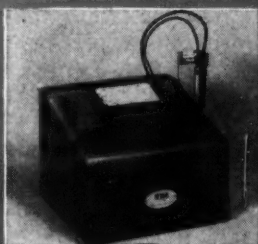
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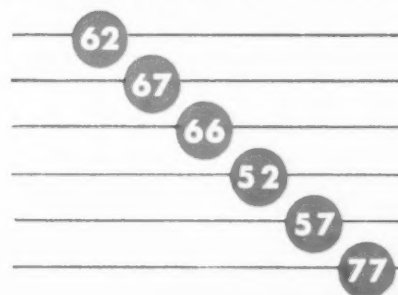
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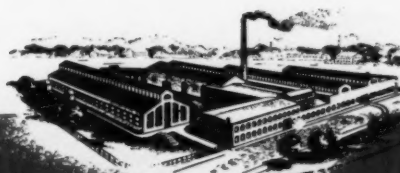
## Sulframin DHL

An ideal leveling agent for the solution of your most vexing dyeing problems. It has powerful leveling and penetrating qualities and assures complete satisfaction in the processing of rayon and acetate fabrics. DHL also lends itself ideally to compounding; and is used extensively in the tanning industries for wetting-back applications.

## Sulframin N

Although of radically different chemical structure, Sulframin N shares many of the advantages inherent in the other Sulframin products. Its strongest feature is its complete immunity to the effects of inorganic acids and alkalis. Consequently it is preferred in the processing and dyeing of wool. Not only is Sulframin N an outstanding leveling agent; it can also be employed safely with any amount of alkali.

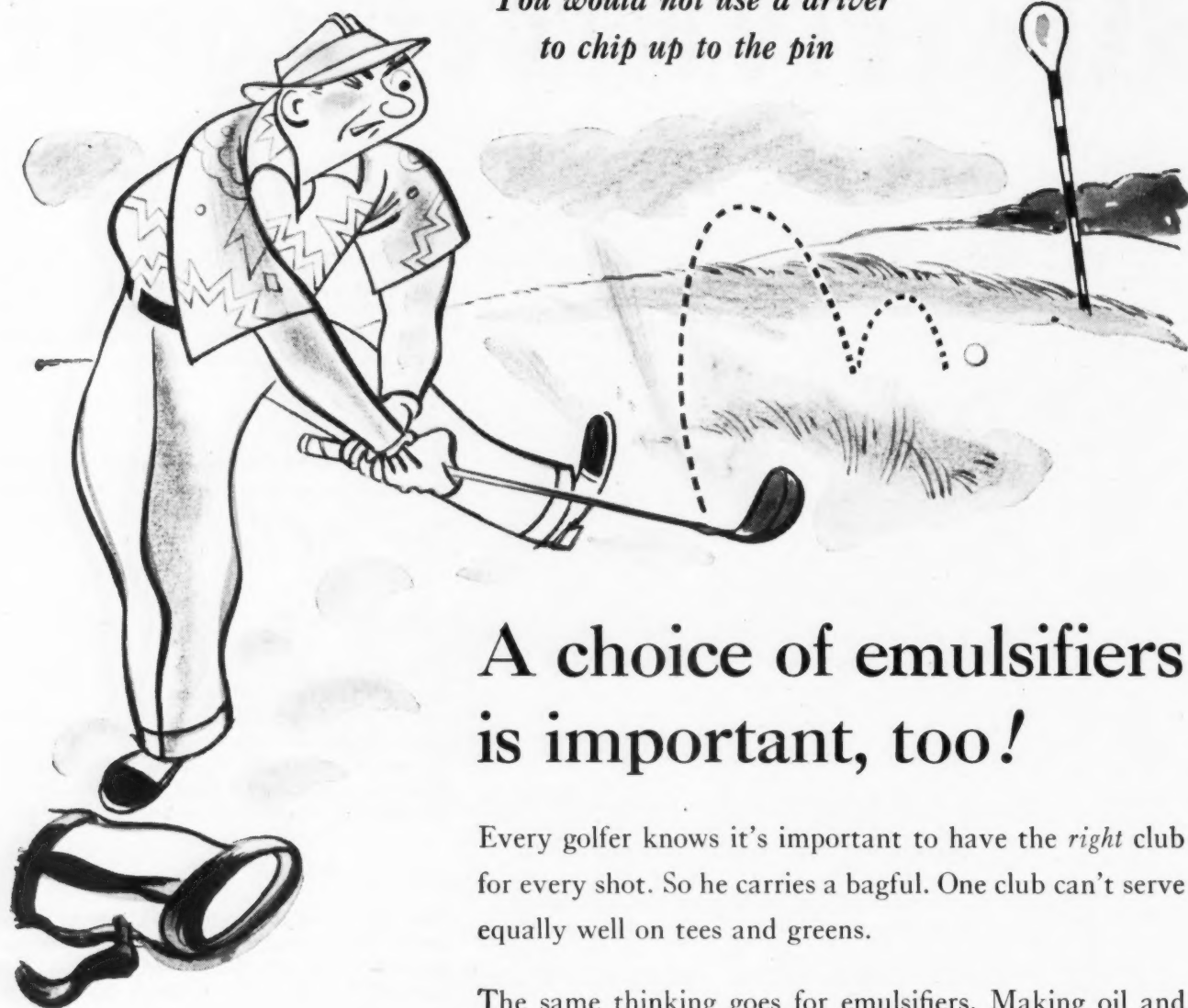
**Ultrapone**, a liquid emulsifying agent (especially useful in water-in-oil emulsions), is readily dispersible in water, and is soluble in all organic compounds, such as hydrocarbons, alcohols, esters, etc. Formulated to lend greater cleaning power to naphtha solutions, Ultrapone is particularly valuable in dry-cleansing detergents; adhesive emulsions, and in the manufacture of many cosmetics.



PATERSON, NEW JERSEY • CHICAGO, ILLINOIS

IN CANADA: Delta Chemical Company, Brantford, Ontario IN MEXICO: Icon, S.A., Mexico, D.F.

*You would not use a driver  
to chip up to the pin*



## A choice of emulsifiers is important, too!

Every golfer knows it's important to have the *right* club for every shot. So he carries a bagful. One club can't serve equally well on tees and greens.

The same thinking goes for emulsifiers. Making oil and water mix is often tricky chemistry. And no one emulsifier can be expected to do all the hundreds of emulsification jobs that industry must perform every day—in foods, cosmetics, textiles, cutting oils, insecticides, polishes and many other applications.

That's why Atlas makes scores of surface active agents, including the well-known SPAN and TWEEN emulsifiers. But even this large range doesn't always hold the right answer, so Atlas maintains a "molecule-building" service to "construct" the precise surface active agent to fit your needs.

Span, Tween—Reg. U. S. Pat. Off

*A consultation with us can frequently save needless trial and error in choosing the correct emulsifier for your individual requirements. As a starter, write now for our book "Atlas Spans and Tweens."*

# ATLAS

INDUSTRIAL CHEMICALS DEPARTMENT



ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE • OFFICES IN PRINCIPAL CITIES • CABLE ADDRESS • ATPOWCO

# What you want to know about

## Phthalic Anhydride

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### BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION  
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Chicago 22, Ill.  
Birmingham, Ala.  
Montreal, Que.  
London, Eng.

## Phthalic Anhydride

● This de luxe 50-page reference manual on the physical and chemical properties, uses, test methods and performance, of Barrett Phthalic Anhydride is the result of extensive research and development. It contains many useful charts and tables conveniently arranged for your use. A free copy for your own reference library will be sent upon request. Please write for it on your business letterhead.

### THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION  
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.  
5551 St. Hubert St., Montreal, Quebec



Reg. U. S. Pat. Off.

#### USEFUL PHYSICAL AND CHEMICAL PROPERTIES

Includes thermodynamic data, solubility statistics, charts of density, viscosity and vapor pressure.

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**TEST METHODS** Solidification point, color, water insoluble matter, resin color, acid number of resins, oxidizable matter, etc.

**USES** A comprehensive list of products and applications.

**FORMULATIONS** Alkyd resins of the phthalic type.

**SOME TYPICAL REACTIONS** Seventeen characteristic chemical equations.

**BIBLIOGRAPHY** With resumes of the subjects covered.

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Yes, the eyes have *it* when it comes to P.A.\*! Take a critical look at *your* product. Does it need a visual shot-in-the-arm? A dingy, muddy or slightly cloudy product offers sales-resistance and encourages customers to "stay away in droves."

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\*Product Appeal



The characteristic which sets Nuchar Activated Carbon apart from ordinary purifiers is that it *removes* impurities... by *adsorption*. Nuchar's magic can also be harnessed, however, to *concentrate* desirable elements (such as penicillin) and release them through *desorption*. This flexibility may be just what the *customer* ordered for your product. Investigate Nuchar's ability to "fence in" the part of your product you want, or its ability to remove impurities.

Get in touch with the Nuchar Technical Staff. You'll find them engaged in rewarding research... research geared to benefit *your* product and American private enterprise as a whole.

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## Line of **Q-SnoFoG** Carbon Dioxide Extinguishers

**GENERAL'S** new 5-lb. **Q-SnoFoG** carbon dioxide extinguisher costs no more than the 4-lb. size—yet gives you 25% more fire protection. This makes **GENERAL Q-SnoFoG** the best buy in the fire extinguisher market—best for protection; best for economy.

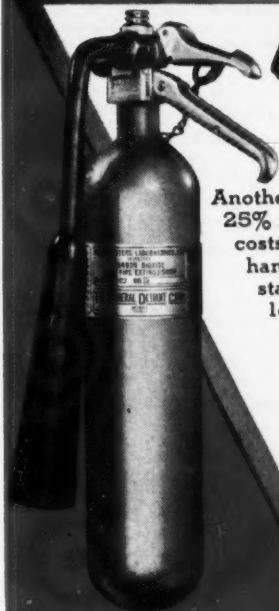
The new 5-lb. **GENERAL Q-SnoFoG** fits the standard 4-lb. wall bracket. Improved design of the shell makes it unusually light and easy to handle, with no sacrifice of structural strength.

IF IT'S **GENERAL** IT'S DEPENDABLE



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Another new **Q-SnoFoG**—2½-lb. size—gives 25% more fire protection than the 2-lb. size, yet costs the same. It is light, strong, and easy to handle, due to improved shell design—an outstanding value. See the yellow section of your local telephone directory for your nearest **GENERAL** dealer. Ask him to show you both these new **Q-SnoFoG** extinguishers, or write for complete details.

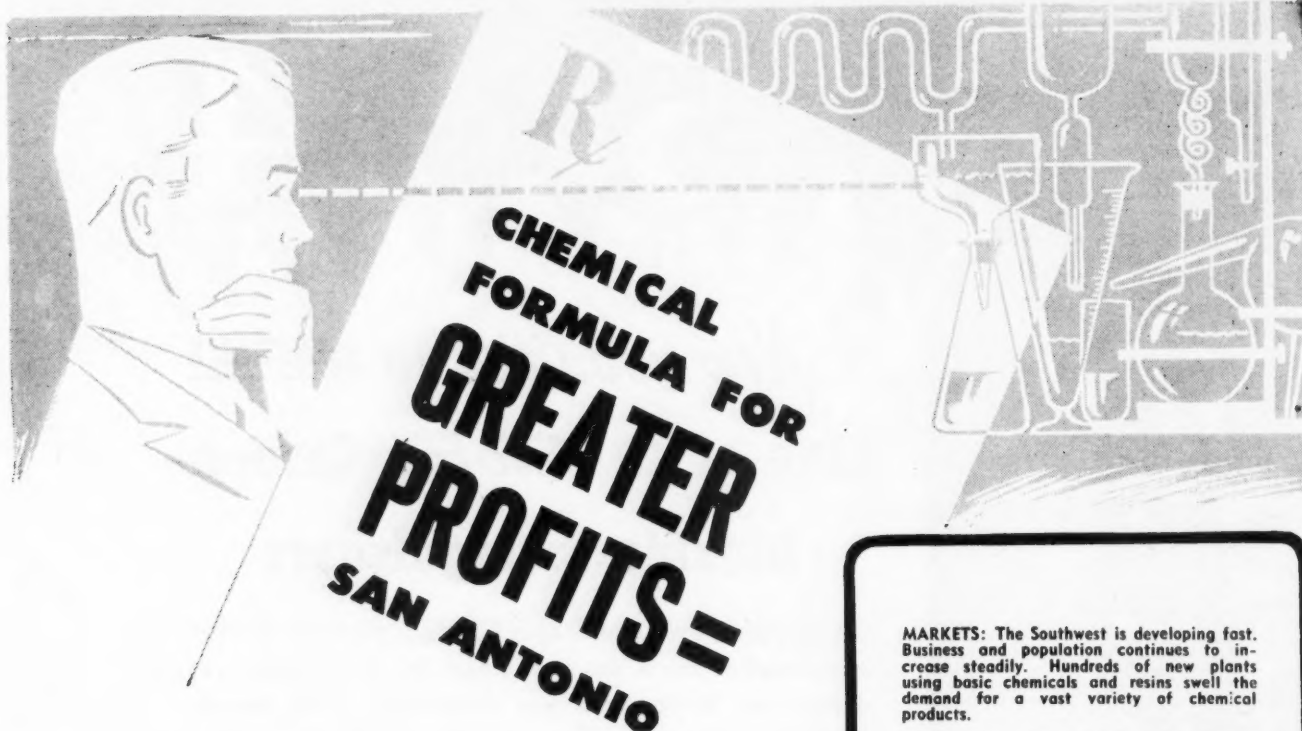


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Put your chemical plant in the midst of a growing market! A profitable new chemical industry is stimulating the economic development of the San Antonio Area! Natural gas and petroleum—the basic raw materials for many chemicals—are abundant and inexpensive. Increased production of basic chemicals and resins is attracting hundreds of new manufacturers of plastics, synthetic fibers, resins, inks, lacquers, medicines, insecticides!

San Antonio production costs are low—due to steady uninterrupted year-round production schedules, low gas and power rates, settled labor condition, state and local tax rates. There's an abundant supply of pure artesian water flowing from deep wells at a constant temperature of 76 degrees. Agricultural and mineral products necessary for most chemical plants are easily obtained.

In short, San Antonio has an ideal set-up for almost any kind of chemical plant! So get the full story on San Antonio and the warm welcome its citizens offer you. Send today for the new book "San Antonio Sets the Stage for Industry". It's yours for the asking if you will attach the coupon to your business letterhead.

**San Antonio**  
*Sets the stage for industry*



**MARKETS:** The Southwest is developing fast. Business and population continues to increase steadily. Hundreds of new plants using basic chemicals and resins swell the demand for a vast variety of chemical products.

**LABOR:** San Antonio offers a large pool of skilled, cooperative, highly adaptable workers. Major labor trouble is unknown.

**TAXES AND INDUSTRIAL LAWS:** Texas has no state sales or income taxes. Industrial laws and regulations are drawn to encourage the development and expansion of industry.

**TRANSPORTATION:** San Antonio is served by major rail, air and truck lines radiating in every direction. Texas has excellent trunk and feeder highways. Only three hours by truck or rail to low-cost water transportation.

**RAW MATERIALS:** Vast reserves of natural gas and oil. Varied agricultural products make the San Antonio area the center of chemurgist activities of United States. Mineral resources only beginning to be utilized.

**POWER AND FUEL:** Natural gas rates for small industries lowest of any large Texas city. Electric power is adequate and reasonable.

**LIVING CONDITIONS:** The mild climate permits low living costs. Parks, playgrounds, popular amusements, sports and recreation facilities are plentiful. Cultural attractions are famous throughout the Americas. From kindergarten through college, public and private schools maintain high educational standards.

**BUILDINGS AND SITES:** Because of the shallow footing required and the mild climate, building construction is economical in San Antonio. Many industries use light structures—carry on outdoor work the year-round. Good industrial sites are still available.

**CLIMATE:** San Antonio's average annual temperature is 69.1 degrees. Afternoon humidity averages 54%. Average rainfall is 27.39 inches per year. 266 sunny days annually.

San Antonio Municipal Adv. Comm.  
741 Insurance Building  
San Antonio 5, Texas

Name.....

Address.....

City..... State.....

# U.S.I. CHEMICAL NEWS

June ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1947

## New Data Uncovered On Use of Butanol In Organic Syntheses

Research in Russia, India, U.S.A.  
May Herald New Applications

Laboratory research by Russian, Indian, and American scientists discloses new information concerning the use of butanol in organic syntheses, according to a number of papers published within the last three years. These discoveries may open new fields of application for this versatile solvent, which is now being used widely in the protective coatings and other important industries.

### New Syntheses

Most recent of the new synthetic uses of butanol involves its conversion to butyric acid. In this method, which is described in an American patent, excess quantities of butyraldehyde are mixed with butanol and a cobalt acetate catalyst in a specially-constructed apparatus. The mixture is then treated with a gaseous oxidizing agent.

Russian scientists revealed recently that butanol when treated with aluminum and iodine under specific conditions will produce an exceptionally high yield of butyl iodide. The reaction is said to be spontaneous and to generate a considerable amount of heat. Another Russian report claims that butyl chloride and some secondary-butyl chloride are obtainable from reacting butanol with ferric chloride.

Although the reaction between hydrochloric acid and butanol has been known for some time, Indian chemists have purportedly discovered a method for increasing the reaction rate. This is claimed to be accomplished by adding benzene to the reaction mixture. The effect is said to be due to the greater solubility of the hydrochloric acid in the butanol as compared to the benzene.

### Standard Applications

Butanol, a medium boiling alcohol, owes its industrial importance in the solvent field to its relatively low evaporation rate, and strong solvent powers for a wide variety of organic materials. Its most important application here is as a latent solvent for nitrocellulose to make airplane dopes, artificial leather, patent and enameled leather, coated paper finishes, non-shatterable glass fillers, printing inks, and photographic film. Butanol is also used as a solvent for a variety of resins.

In general, this compound is an excellent

(Continued on page 2, column 2)

## Protein Synthesis Observed Outside Body for First Time

The synthesis of proteins has been observed for the first time outside of the animal body through the application of radioactive tracers, according to a report published recently by two American scientists. These biochemists placed slices of animal liver in a solution containing radioactive methionine. Although the total protein content of the tissue decreased, the liver was shown to be still actively synthesizing new protein by the incorporation of methionine containing radioactive sulfur by the formation of peptide linkages. The research may lead to methods of coming to direct grips with protein synthesis *in vitro*, the authors state.

## Present Exterior Paints Better Than Pre-War, Says E. T. Trigg

President of National Paint, Varnish, and Lacquer Association  
States Few Items Now Give More Dollar Value Than Paints

WASHINGTON, June 2. — In an interview today, Ernest T. Trigg, President of the National Paint, Varnish, and Lacquer Association stated that in his opinion there are few if any commodities for which the consumer is now

getting more dollar value than in his paint purchases. "As far as exterior paints are concerned," he went on, "there are many who have the conviction that the war-time paints are equal or superior to pre-war types, and this conviction is so deep-seated that they do not expect ever to revert to their old formulas."

Pointing out that the protective coatings industry was forced to meet skyrocketing war-time production demands in the face of critical

### THE MONTH IN COATINGS

A substitute for casein in paints is reported to be alginic acid, a marine plant derivative . . . A survey of methods for testing coating resins, which is said to avoid duplication of the work of other groups and to be wide in scope, is published . . . To cut can damage and save floor space, a new device is marketed for stocking, storing, transporting, and displaying round cans . . . A photosensitive lacquer, which is said to be tough enough to require no hand-applied reinforcement and to increase fineness of detail and accuracy of production, is announced . . . A dual-service "wash-primer," is described as a vinyl resin base material which serves as a metal surface conditioning agent and a priming coat . . . A "can mobilometer" is on the market for measuring the viscosity of materials in their original containers . . .

## U.S.I. Reduces Prices Of Synthetic Resins

Despite the fact that resin availability is lagging well behind demands, U. S. Industrial Chemicals has announced a reduction of approximately 10 per cent in its prices on practically all types. The price reduction is the second general cut U.S.I. has made on synthetic resins since prices were decontrolled. The reductions have been made possible by lowered costs and improved production methods.

Synthetic resins manufactured by U.S.I. are used in the production of protective coatings, such as paints, varnishes, lacquers, enamels, as well as many specialty products. These resins are manufactured in U.S.I. plants at Newark, Baltimore, and Pensacola.

### Booklet on Shipping Chemicals Now Available

A 32-page pamphlet on tank car classifications for loadings, listing the chemicals usually shipped by tank cars, and the class of cars permitted by the Interstate Commerce Commission, is now available. The AAR classification of cars and ICC rules for shipping are included.



"I have little hesitation in stating that all during the war and right up to the present, there have been few, if any, commodities for which the consumer has received more value for his dollar than paint."—E. T. Trigg

shortages, he asserted that there was nevertheless no real sacrifice in quality. "During the war," he said, "members of the paint, varnish and lacquer industry were called upon to furnish protective coatings for the army and navy in prodigious quantities. Ships, tanks, planes, guns — every piece of ammunition down to the smallest shell — all required the products of our industry to keep them in fighting trim and ready to go into action at the proper time. We also had to meet the paint requirements of the camps and training stations where millions of our young men were housed while preparing for overseas duty, of the huge new plants constructed to provide the sinews of war, and of the housing which was needed for the workers in these war plants.

"Our industry met every military requirement and all essential civilian requirements," he continued, "despite the shortages of many critical materials. Although some of the modern fast drying paints could not be made because certain critical materials were going into military uses, comparable results were obtained with slower-drying finishes. There

(Continued on page 2, column 1)

**Present-Day Paints**

(Continued from page 1, column 3)

was never any real sacrifice in quality," he reiterated.

**Only One Fundamental Change**

According to Mr. Trigg, the only fundamental change that was made in paint formulation during the war was occasioned by the War Production Board Conservation Order M-332 which limited the quantities of oil used in several types of paint. This order was put into effect in accordance with the recommendations of a committee of outstanding paint technologists based upon their own knowledge and experience, and was in keeping with a trend which had already begun.

"For example," Mr. Trigg said, "before the war, exterior house paints contained about 5 pounds of raw linseed oil. The WPB order limited them to 3.75 pounds of oil. But the oil which was used was a bodied oil to which 1.25 pounds of thinner could be added to give a vehicle comparable to raw linseed oil in its properties."

How do these new exterior paints compare with the pre-war type?

"We determined that," Mr. Trigg said. "Soon after the order became effective, the Scientific Section of the National Paint, Varnish, and Lacquer Association placed panels coated with a number of 'conservation' paints on our exterior test fence. We exposed them in direct comparison with the first-line paints made by the same manufacturers in 1940. Today, after more than three years of exposure, the 'conservation' paints appear to be equal in integrity to the old-type paints. They are cleaner and give a better appearance because of their self-washing qualities."

**Sees Bright Future**

"The lessons of the war have been absorbed and are being reflected in improved paints for architectural surfaces and in specialized finishes as well," Mr. Trigg declared. "Research programs are being carried on continuously in the laboratories of paint manufacturers and their raw material suppliers—and while these hold promise for the future, there should be no hesitation upon the part of the consumer in accepting the products of reputable manufacturers today."

**More Riboflavin Needed in Poultry Feeds**

Recent experiments indicate that present riboflavin recommendations for poultry are inadequate. This was especially true in rations designed for high hatchability and weight

**Reports "Tongue Prints" Simplify Disease Diagnosis**

A simple and accurate method for taking "tongue prints" will aid in the treatment of many diseases, according to a paper published recently in an American medical journal. The tongue print, which is said to be as individual as a fingerprint, is reported to alter in measurable fashion during disease, providing an accurate means of diagnosis. Basis of the new method is a special ink described as containing Evan's blue, gum acacia, and chlorobutanol, a derivative of acetone. The print is obtained by applying the inking solution, then pressing cardboard-backed paper against the tongue in a prescribed manner.

**Geiger Counter Made Into Sensitive Fire Alarm**

A redesigned Geiger counter, a device formerly used to detect dangerous X-rays or those present in atomic material, can now report the presence of flames, according to a recent announcement. The device is said to be so sensitive that it can spot a match flame yards away, or sound an alarm at the sparks from the wheel of a cigarette lighter. The instrument is only 1½" in diameter and 6¼" long, with an electrically charged tungsten wire running through the center and a quartz window at one end. When ultra-violet rays from a flame pass through the eye, an electric charge is released.

**New Butanol Data**

(Continued from page 1, column 1)

blending agent for holding immiscible liquids together in a homogeneous solution, or for preventing the precipitation of otherwise incompatible solids. Miscellaneous solvent uses are for brake fluids, hydraulic shock absorber fluids, insect sprays, penetrating oils, polishes, and metal cleaners. It is also a detergent, a dehydrating agent, a surface tension depressant, and an anti-foaming agent.

**TECHNICAL DEVELOPMENTS**

Further information on these items may be obtained by writing to U.S.I.

**To prevent wood decay**, a new primer, or sealer, has been placed on the market, which is said to combat mildew and rot in hot, wet climates. (No. 202)

USI

**A new hand-operated emulsifier** is claimed to disperse small quantities of immiscible liquids into a homogeneous emulsion by means of a few vigorous strokes. (No. 203)

USI

**To stabilize plastics against light**, a new product has been developed which is alleged to be effective in quantities as low as three per cent. (No. 204)

USI

**A new dip-coating plastic**, is said to provide adequate protection for all types of equipment with a single dip. The coating is claimed to resist acids, alkalis, oxidizing agents, and some solvents. (No. 205)

USI

**To improve the fastness of dyes**, a new after-treating compound is offered. (No. 206)

USI

**A substitute for red lead or zinc chromate** in conventional paint primers is described as a muscovite mica containing graphite. (No. 207)

USI

**Two new adhesives** have been placed on the market. One is described as a cold-setting thermoplastic, synthetic waterproof adhesive with high resistance to oxidation. The other, a liquid, is claimed to adhere to any material and develop strong tack immediately. (No. 208)

USI

**To remove silica from boiler feed water** new equipment, which applies the principles of demineralizing, has been developed. (No. 209)

USI

**To bond vinyl to vinyl sheets** or other stocks coated with these materials is now possible by means of a new adhesive, the manufacturer states. (No. 210)

USI

**To resist summer heat rays**, a new roof paint is being offered which is said to cut interior temperatures as much as 15 degrees by deflecting 70 per cent of the sun's heat rays. (No. 211)

USI

**To stabilize rayons permanently** is the purpose of a new process which is alleged to cut rayon shrinkage down to the range of 0 to 1 per cent. (No. 212)

USI

**A new corrosion-proofing material** has self-sealing properties and can be patched over areas from which it has been removed, according to the manufacturer. (No. 213)

(No. 213)

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**OXALIC ESTERS**

Dibutyl Oxalate  
Diethyl Oxalate

**PHTHALIC ESTERS**

Diamyl Phthalate  
Dibutyl Phthalate  
Diethyl Phthalate

**OTHER ESTERS**

\*Diatol  
Diethyl Carbonate  
Ethyl Chloroformate  
Ethyl Formate

**INTERMEDIATES**

Acetoacetonilide  
Acetoacet-ortho-anisidide  
Acetoacet-ortho-chloranilide  
Acetoacet-ortho-toluidide  
Acetoacet-para-chloranilide  
Alpha-acetylbutyrolactone  
5-Chloro-2-pentanone  
5-Diethylamino-2-pentanone  
Ethyl Acetoacetate  
Ethyl Benzoylacetate  
Ethyl Alpha-Oxalpropionate  
Ethyl Sodium Oxalacetate  
Methyl Cyclopropyl Ketone

**ETHERS**

Ethyl Ether  
Ethyl Ether Absolute—A.C.S.

**FEED CONCENTRATES**

Riboflavin Concentrates  
\*Vacatone 40  
\*Curbay B-G \*Curbay Special Liquid

**ACETONE**

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Ester Gums—all types  
Congo Gums—raw, fused & esterified  
\*Aropiaz—alkyds and allied materials  
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**OTHER PRODUCTS**

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Nitrocellulose Solutions dl-Methionine

Printed in U.S.A.



## The Sultan's Medical Monopoly

Earth from the Isle of Lemnos was deemed specific for many ailments from the time of Herodotus to the beginning of the last century. It is a greasy, gritless clay consisting of oxide of *aluminum*, silica, chalk and magnesia. Lemnian earth was held in high esteem as an antidote for all poisons, and was given for dysenteries, internal ulcers, hemorrhages, and pestilential fevers. Externally it was applied to festering wounds.

For centuries Lemnian earth was the monopoly of the Sultan of Turkey, and the penalty of death was attached to opening the source pit by unauthorized persons.

Until recently the earth was dug with great ceremony on only one day each year. The pit, which was kept closed during the remainder of the year, was opened with solemn

rites by the priests on the sixth day of August, six hours after sunrise. The earth was washed, dried, and then molded into blocks and imprinted with a seal. It was then sent to Constantinople for distribution.

Not until the advent of modern science has it been possible to obtain aluminum compounds—ingredients of Lemnian and other earths—in commercial quantities and of uniform dependable purity. Today Mallinckrodt aluminum compounds bear the trademark of a firm which has been manufacturing fine chemicals for eighty years.

For aluminum products of uniformity, purity and dependability specify Mallinckrodt Aluminum Acetate, Chloride, Citrate, Hydroxide, Stearate, Sulfate, Alums and other compounds.

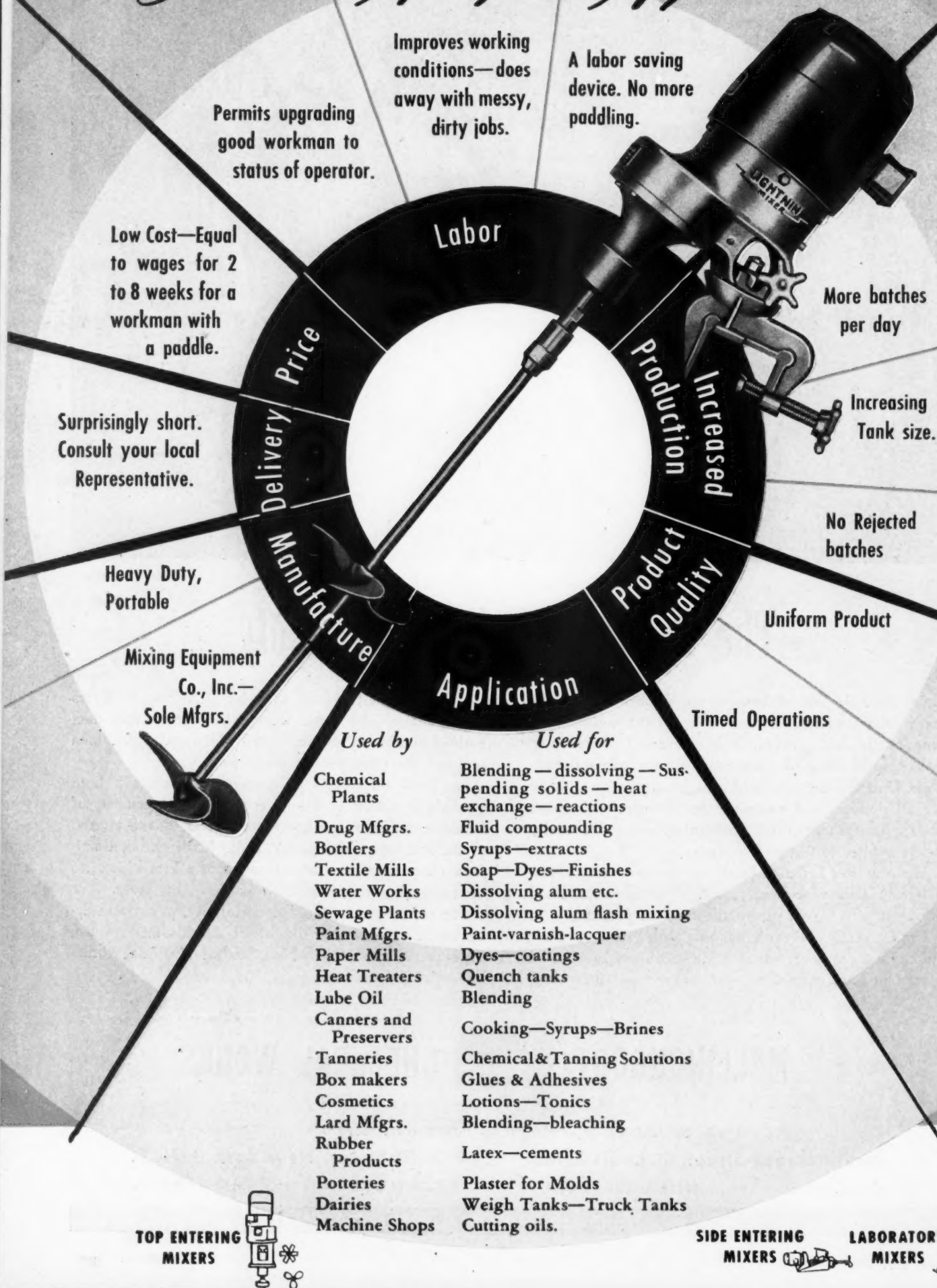
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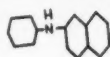
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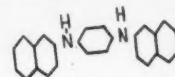
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Purity 98.0%



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Available in commercial quantities

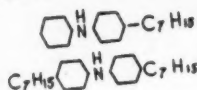
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Purity 98%



## Mixed Mono-and Diheptyl Diphenyl Amines

Available in commercial quantities  
Distillation range—145-245  
(3.0 mm)

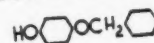
Purity 98%



## Monobenzyl Ether of Hydroquinone

Available in commercial quantities

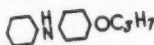
M. P. 113°  
Purity 90%



## Isopropoxy Diphenyl Amine

Available in commercial quantities

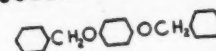
M. P. 78°  
Purity 92% min.



## Dibenzyl Ether of Hydroquinone

Available in Pilot Plant quantities

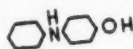
M. P. 119°  
Purity 85%



## p Hydroxy Diphenyl Amine

Available in commercial quantities

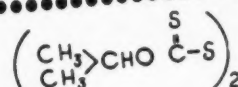
M. P. 15°  
Purity 92%



## Di Isopropyl Dixanthogen

Available in commercial quantities

M. P. 52°  
Purity 98%



## N-Nitroso Diphenyl Amine

Available in commercial quantities

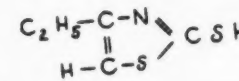
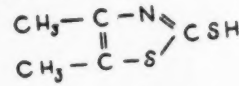
M. P. 62°  
Purity 97%



## Mixed Ethyl and Dimethyl Mercaptothiazoles

Available in commercial quantities

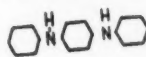
M. P. 136-153°  
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles



## Diphenyl p Phenylene Diamine

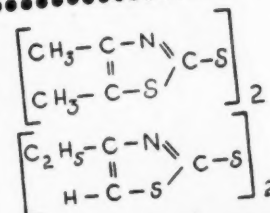
Available in commercial quantities

M. P. 144°  
Purity 92%



## Mixed Aliphatic Thiazyl Disulfides

Available in commercial quantities  
Liquid



For additional information please write B. F. Goodrich Chemical Company, Department CE-6, Rose Building, Cleveland 15, Ohio

# B. F. Goodrich Chemical Company

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# If you are interested in *Hydrogenation*

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Whatever the stage of your "thinking" regarding the hydrogenation of your products or raw materials, you ought to have a copy of the new Hooker Hydrogenation Bulletin. This Bulletin describes the hydrogenation facilities of Hooker's two plants, the types of hydrogenations we are doing, the procedure for both preliminary and laboratory evaluation and the help that Hooker hydrogenation experts can give you.

Hooker has been carrying out hydrogenations at pressures as high as 2500 p.s.i. Careful supervision and the use of high purity hydrogen, a co-product from the electrolytic production of chlorine and caustic soda, assure commercial process-

ing with no diminution of product purity.

Demands on Hooker facilities for hydrogenation are increasing continually. If you are considering hydrogenation, even remotely, we suggest you send for a copy of this Hydrogenation Bulletin, No. 8. A request on your company letterhead will bring it to you. Your next step might well be a discussion of your needs with us so that when ready, your hydrogenation requirements may be fulfilled without delay.



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# FOR YOUR INFORMATION

## WORLD'S LARGEST COMMERCIAL PRODUCER OF PHOSPHORUS

**Monsanto is adding  
still more capacity  
to meet new and growing needs**

Already the world's largest commercial producer of elemental phosphorus, phosphoric acid and phosphates for industrial and food-products use, Monsanto Chemical Company is increasing its overall capacity by more than 40%! For this, there are two far-reaching reasons — Monsanto's continuing development and manufacture of new phosphorus derivatives, and the growing use of the multitude of products that already stem from this versatile Monsanto chemical.

### **Monsanto Production of Phosphorus A Tremendous Operation**

Out of Monsanto's extensive phosphate rock deposits in Tennessee, batteries of drag-line scoops take

10-ton cubic-yard bites. This ore is converted in electric furnaces where Monsanto phosphorus is refined to better than 99.9% purity — then shipped in tank-cars to strategically located Monsanto plants for conversion into many products having wide applications in industry. Now, *all this is being increased by more than 40%.*

### **Generator of New Products — Monsanto Research**

Research has played an essential part in achieving Monsanto's world-wide leadership in the commercial manufacture of this chemical of ever-new uses. During the past 10 years numerous new products from phosphorus were developed commercially — all manufactured entirely by Monsanto

— many of them far-reaching in their applications.

As to the future, this much is certain: Through research, entirely new products of phosphorus will be developed and manufactured by Monsanto. Many are already well under way, in pilot-plant stages, the subjects of extensive laboratory and field tests.

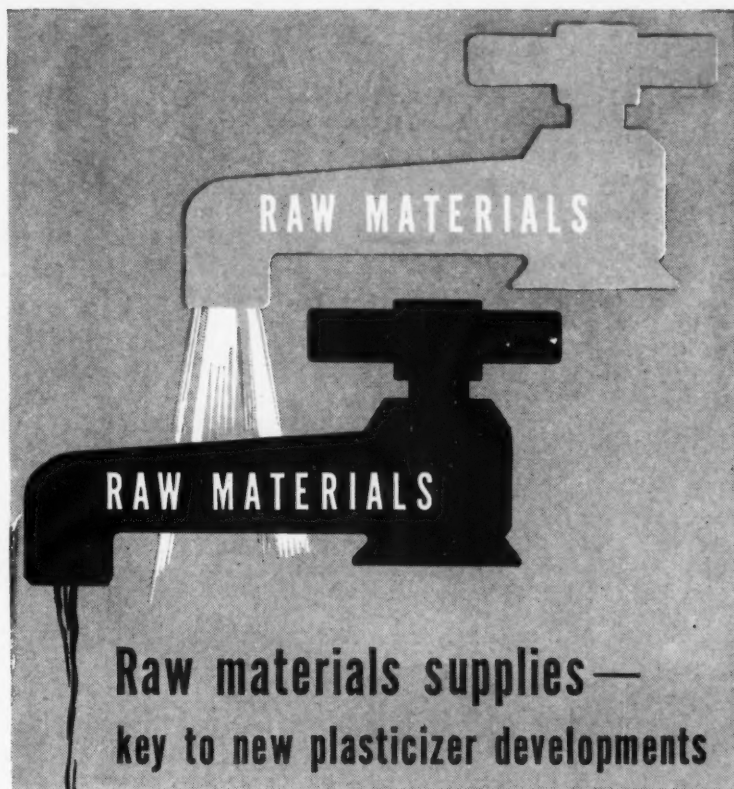
Send for your copy of new Monsanto booklet — "Phosphorus, the Light Bearer" ... Monsanto Chemical Company, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

### **Products of Monsanto PHOSPHORUS**

Phosphorus (Yellow)	Sodium Acid Pyrophosphate	Sodium Iron Pyrophosphate
Phosphoric Acid	Tetra Sodium Pyrophosphate	Mono Ammonium Phosphate
Phosphorus Pentoxide	Hemi Sodium Phosphate	Di Ammonium Phosphate
Phosphorus Oxichloride	Sodium Poly Phosphates	Aluminum Phosphates
Phosphorus Trichloride	Mono Calcium Phosphate	Potassium Phosphates
Tricresyl Phosphate	Di Calcium Phosphate	Magnesium Phosphates
Triphenyl Phosphate	Tri Calcium Phosphate	Alkyl Acid Phosphates
Mono Sodium Phosphate	Calcium Pyrophosphate	Alkyl Phosphate Salts
Di Sodium Phosphate	Ferric Orthophosphate	Special Phosphates
Tri Sodium Phosphate		Ferro Phosphorus



# News of Monsanto Chemicals and Plastics for the Process Industries....June, 1947



While the production of new Monsanto plasticizers is largely contingent on basic chemicals, now in short supply, these shortages have not deterred the progress of Monsanto's research and field-test activities ... On the contrary, greater emphasis is being placed on new Monsanto plasticizers which can be developed around those raw materials that are most likely to be available soonest, in largest quantities. This "product-priority" means that new Monsanto plasticizers will reach a stabilized commercial stage at the earliest possible moment.

Meantime, laboratory research and field tests are being continued on a broad base. Already it is evident that forthcoming Monsanto plasticizers will be far more versatile and adaptable in their application. They promise to set new standards of compatibility, flexibility, volatility, burning rates, heat and light stability, permanence, abrasion resistance, elasticity.

## PRESENT MONSANTO PLASTICIZERS

Aroclors\* • Dibutyl Phthalate • Diethyl Phthalate • Dimethyl Phthalate • HB-40 • Ortho-Nitrobiphenyl • Santicizer\* 8 • Santicizer 9 • Santicizer B-16 • Santicizer E-15 • Santicizer M-17 • Santicizer 140 • Triphenyl Phosphate • Tricresyl Phosphate.

\*Reg. U. S. Pat. Off.

## Blueprints are bluer now

An improved chemical coating which intensifies the blue of a blueprint, deepens contrast and thus increases legibility, was recently announced by Monsanto. The product, Mertone WB-2,† is a silica aquasol and is used as a precoat on paper, which is subsequently coated with light sensitive blueprint solutions. It makes possible a more uniform coverage of paper by the blueprint solutions when the new chemical is used as a precoat.

## Boston Sales Office

The new Boston office recently established by Monsanto will handle regional sales of organic chemicals, phosphates, alcohol and dry ice. It will serve also as a divisional branch of the company's export sales and shipping department.

## Monsanto Opens Office in Houston

To serve the industries of Texas better, Monsanto has established its Texas Headquarters Offices in Houston. Activities of this new office will center around the operations of Monsanto's Organic and Merrimac Divisions. Phosphate Division activities will continue to be handled out of Birmingham, Alabama — Plastics activities out of St. Louis.



SERVING INDUSTRY... WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, 1700 South Second Street, St. Louis 4, Missouri... District Sales Offices: New York, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

†Reg. Applied For.

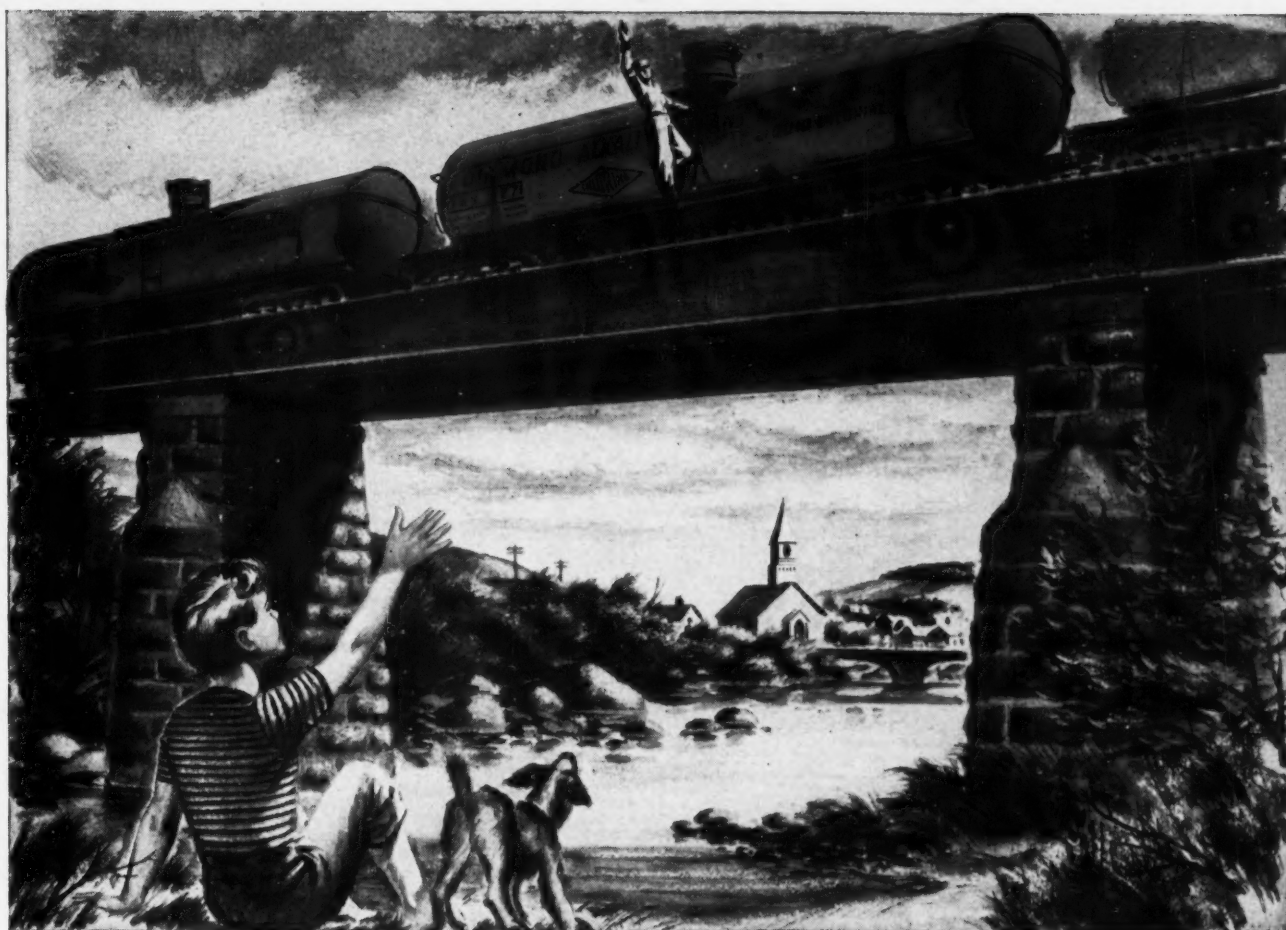
# SODIUM NITRITE



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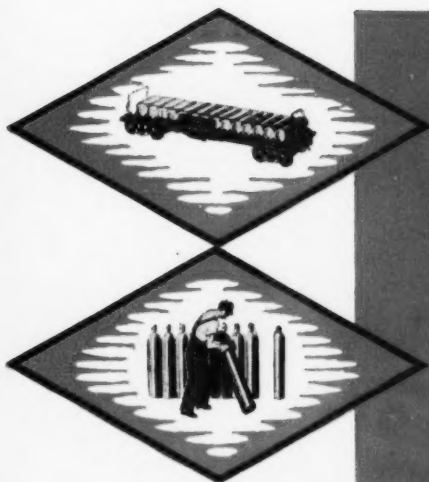
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**Chicago Office: 230 N. Michigan Ave.**



# DIAMOND *Liquid* CHLORINE

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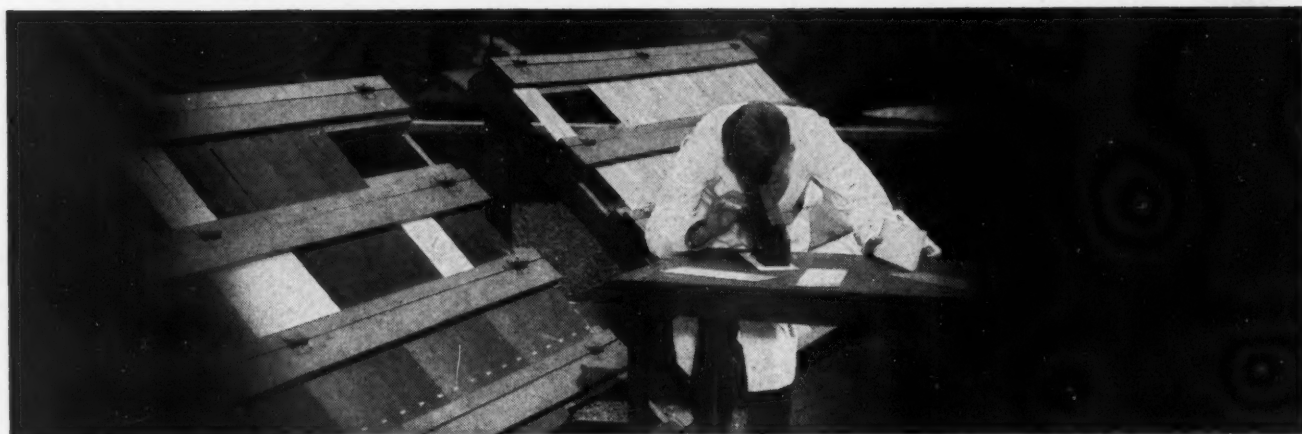
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**DIAMOND ALKALI COMPANY**

PITTSBURGH 22, PA., and Everywhere





excellent  
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and low  
oil  
absorption

recommend No. 4035 C.P. **CHINESE BLUE**

It will be good news to formulators that No. 4035 is now being produced in vastly increased quantities, because this jet-green Blue has long been accepted as the standard in its class. It is relatively low in oil absorption, and its reactivity and grinding properties are good. It possesses a

very jet, non-bronzing masstone and reduces with white to a clean greenish tint. The fine weathering properties of No. 4035 make it the choice for paints, enamels and lacquers for every purpose. Place your order direct with the Sales Department, 105 Bedford Avenue, Brooklyn 11, New York.

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UMBERS • VENETIAN RED • VIENNA LIME • VOLCANIC ASH • VOLCLAY • WHITING • YELLOW OXIDE • ZINC OXIDE • ZINC STEARATE

# CALCIUM CARBONATE

## The long and the short of it

We have had a lot of experience in meeting the demand for Calcium Carbonate.



For years, the paper industry has been using Wyandotte Precipitated Calcium Carbonate as an essential ingredient of high-grade coating, giving whiteness and brightness to the product.



In the paint and varnish industry, Wyandotte Precipitated Calcium Carbonate is an extender of superior quality.



It is the best reinforcing agent known for many rubber products—lending tensile strength and tear resistance to gloves, hot-water bottles, hospital sheeting and inner tubes.



Now industry is finding many *new* uses for Wyandotte Precipitated Calcium Carbonate—such as the calcium enrichment of food products where quality and purity are of paramount importance.



All these new demands for Wyandotte Precipitated Calcium Carbonate—coming on top of increasingly heavy demands for old uses—have taxed our production facilities.

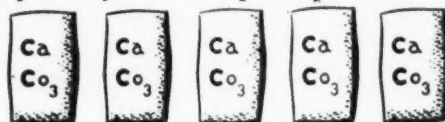


Meanwhile, we are doing everything possible to increase production of Wyandotte Precipitated Calcium Carbonate.



We are putting up *three new Calcium Carbonate units*.

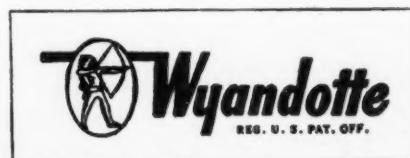
And we look forward to the day when we shall be able to supply every user of quality Calcium Carbonate with all he wants of this versatile chemical.



**WYANDOTTE CHEMICALS CORPORATION**

WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine Hydrogen • Sodium Zincates • Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals





**HIGHLY ADHESIVE**

**\* DIAMOND  
CHLOROWAX**

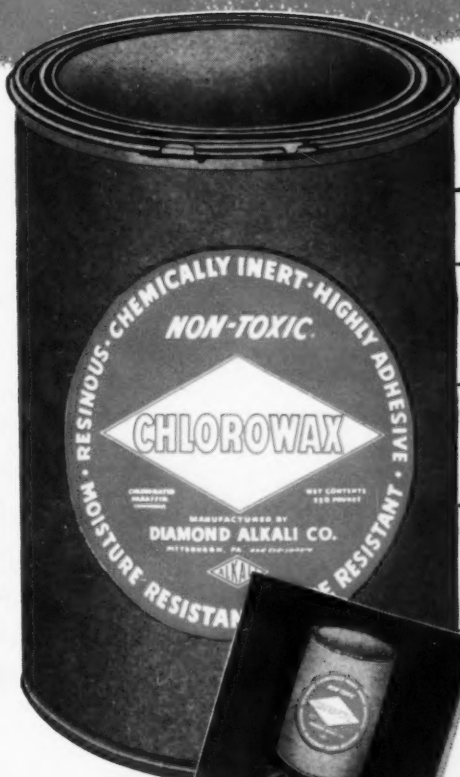
**RESINOUS CHLORINATED PARAFFIN**

Diamond Chlorowax gives a highly adhesive quality to interior and exterior paints—varnishes and lacquers—textile coatings—paper coatings—printing inks—glues and adhesives. It is widely compatible with resins, rubbers, vegetable oils and natural waxes, and improves moisture vapor resistance of some resins. Have you tried it in your formula?

\*Reg. U. S. Pat. Off.

**DIAMOND ALKALI CO.**

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FLAME  
RESISTANT

WATER  
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CONTENTS OF  
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booklet Today!*

This revised bulletin gives chemical and physical properties, solvents, compatibility and other pertinent data about Chlorowax and its many uses. Write for your copy today.

# MERCK IS SERVING THE INSECTICIDE INDUSTRY AS A BASIC SOURCE OF SUPPLY FOR DDT



*An aerial view of the Main Plant of Merck & Co., Inc. at Rahway, N. J.*

As expanding facilities and raw materials come into operation, and current commitments are provided for, we will find increasing opportunities to co-operate with manufacturers of DDT insecticides.

*The product we offer is—*

## DDT

### TECHNICAL

(dichloro-diphenyl-trichloroethane)

**Setting Point 89° C. Minimum  
For Manufacturing Purposes Only**

Please address your inquiry to the Insecticide Products  
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## DDT

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Horticultural, and Household Insecticides**

MERCK & CO., Inc. RAHWAY, N. J.

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# Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

For your information:

Newsletter  
June 1, 1947

McCarthy Chemical Co. will soon admit that it plans to make formaldehyde, alcohols, ketones and incidental quantities of benzene -- by the oxidation of hydrocarbon gases -- at the plant it is now building at Winne, Texas. Operations will be quite similar to those of the Celanese Chemcel project, but, significantly, McCarthy has let a contract for erection of a large oxygen unit.

Within the next few months a prominent engineering firm will reveal its intention to sell small-scale oxygen plants as package units. Design work is virtually completed and the company will soon be in a position to talk business. Expected market: chemical manufacturers and welding shops. Incidentally, you can also expect to hear more about package formaldehyde units -- capable of producing from a ton a day up -- this fall. Plans are being held up at present by the methanol shortage. Makers of resins will be the main prospects.

\* \* \* \* \*

Scheduled for early promotion are two new synthetic detergents, Chat, made by General Aniline, and Lucenol, a Monsanto product. General Aniline will push Chat (polyethylene oxide base) for dishwashing machines and automatic washers, will stress its low foam level. Arrangements have been completed with Thor and Henry J. Kaiser's Fleetwing washer division, so that Chat will be recommended for use in those companies' machines. Lucenol will be promoted as a wool-scouring agent. Chemically it is similar to Monsanto's Sterox -- synthetic detergent plus TSPP.

Now in the development stage at Du Pont's Grasselli Chemicals Dept. are two heat-transfer agents possessing interesting properties. Not silicones, they are complex butyl silicates.

\* \* \* \* \*

Trojan Powder Co. is busy making laboratory quantities of trimethylolpropane and entertaining thoughts of commercial manufacture when raw material supplies ease. Made by reacting butyraldehyde with formaldehyde, TMP found extensive use in Germany. Combined with phthalic, adipic, or other organic acids, it yields alkyd resins, shellac substitutes, lacquer plasticizers, and adhesive gums.

It is quite probable that you will hear more about a complex chromate

which Carbide and Carbon Chemicals has been testing as an agent for the control of certain diseases which attack grasses -- particularly bent grass, the golf green variety. This item, plus several others the company is evaluating, will probably form the nucleus of a new agricultural specialties line Carbide will launch either this season or next.

\* \* \* \* \*

An important change in Mathieson Alkali's policy regarding licensing of its caustic-chlorine cells is in the offing. Hitherto Mathieson has refused to license any chlorine makers, but recently the company completed a deal with Aluminum Co. of Canada Ltd. for the installation of a number of its stationary, mercury-type cells at Arvida, Que. Each unit has a daily capacity of 1000 pounds of caustic (dry basis) and yields 50 per cent liquor directly at the cell. At the moment Mathieson will consider only "foreign" licensees, but a broadening of policy to include U. S. installations is in prospect.

Phthalic anhydride will take a significant step forward later this month by moving up into the ranks of tank car chemicals. The first tank shipment will be made from a point east of the Rockies to General Electric's plant at Anaheim, Cal.

\* \* \* \* \*

Here's the present picture on a few much-discussed detergent projects: Phillips Petroleum Co. will break into the business next year by offering alkyl benzene to detergent makers. A few samples have been distributed, but prices have not been set. Standard of Indiana will probably enter the field with an alkyl aryl sulfonate. Socony-Vacuum, after carefully eyeing the picture, has decided against making a synthetic detergent -- for the nonce at least.

It may be quite some time before details filter out, but the Glidden Co. is actively pursuing research on water-emulsion paints for exterior use.

\* \* \* \* \*

#### Here and There:

A. E. Staley Co. is offering experimental lots of a new soybean-derived streptomycin nutrient ... Next month Pennsylvania Salt Manufacturing Co. will seek stockholders' approval of a plan to boost authorized capital from \$10 to \$30 million. It will involve immediate issuance of \$5 million of preferred stock. The funds thus made available will be used mainly for expansion of facilities at Wyandotte, Mich. and Portland, Ore. But don't overlook Pennsalt's keen interest in elemental fluorine ... Carthage Hydrocol will market its chemical products (alcohols, aldehydes, ketones) through Stanolind. Sales policy will favor contracts with a few large consumers ... Fine Organics is experimenting with octylresorcinol. Preliminary results indicate that it is superior, in some respects, to hexylresorcinol, and potentially cheaper ... Our reference last month to \$1.20 oxygen should have read \$4.20. However, the error does not change the significance of our comments on the Deacon process.

*The Editors*

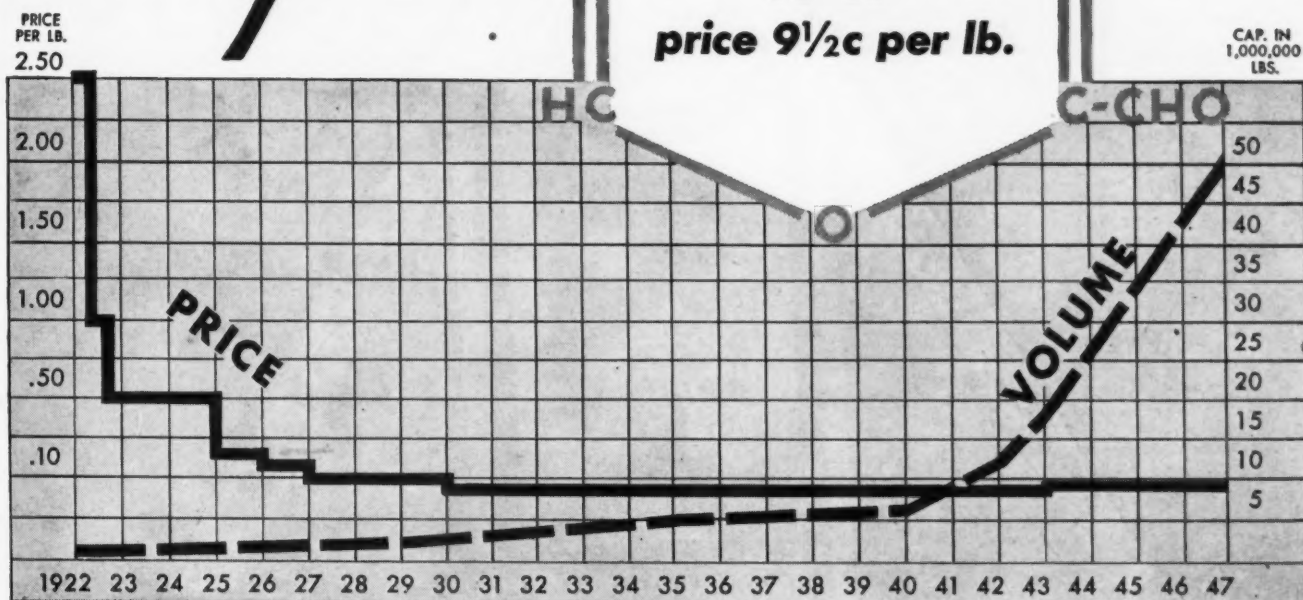
# Furfural

HC

CH

1922  
price \$2.50 per lb.

1947  
price 9½¢ per lb.



ON February 27, 1922 the first commercial shipment of furfural was made. A daring research chemist paid \$2.50 for a pound of this new aldehyde, originally made from oat hulls, a byproduct of Quaker Oats.

Today, just twenty-five years later, thanks to the research, imagination, and skill of chemists in all industry, furfural is an important industrial chemical. Annual capacity is 50,000,000 pounds and price is 9½¢ a pound—making it the cheapest pure aldehyde available today.

Even with this startling expansion the use of furfural is destined to spread even greater in the next twenty-five years because of its versatility. As a selective solvent, furfural is well established and continuing to grow in the petroleum field where more oil is being refined with furfural than with any other selective

solvent. These properties are also being used to advantage in the manufacture of butadiene, in the purification of wood rosin, tall oil and sulfate turpentine and solvent extraction of glyceride oil.

As a resin former, a wetting agent and a chemical intermediate, furfural is rapidly enhancing its position in many different fields. Our researches and its present diversified uses indicate that furfural can prove of exceptional value in still more fields.

If you are not using furfural, we suggest that you can become acquainted with its properties and possibilities by sending for some of the literature we have prepared. A request on your company letterhead will bring you Bulletin 201, "General Information About Furfural" and a list of the other literature available.

## The Quaker Oats Company

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## TO BUILD OR NOT TO BUILD

by ROBERT L. TAYLOR, Editor

STILL ON THE MINDS of many executives and directors of chemical companies is the question of whether to proceed with expansion plans or not.

At one time or another during the past eighteen months virtually every major chemical producer has announced plans for new or expanded plant facilities on a more or less sizable scale. In a few individual cases the announced plans have even exceeded actual construction during the war years.

As early as last fall, however, signs of hesitancy began to appear. Those who had gone ahead were running into difficulties in obtaining necessary materials and labor, and costs were running from 20 to 100 per cent above estimates. By January, two out of ten major chemical producers queried by CHEMICAL INDUSTRIES had decided to defer parts of their original programs on which construction had not been started. The past few months have seen an increasing number of projects put on the shelf or even stopped in the middle of construction.

**The decision** to build or not to build is seldom a simple one. It is made more difficult in many cases today by conflicting considerations of high construction costs on the one hand and still-high demand on the other.

Good economics always dictates expansion during periods of slack business, not during booms. Many economists—and even building industry people—predict that construction costs will be down 10 to 30 per cent by the end of the year, perhaps more in 1948. Thus postponement of major building for six months or more could well result in a substantial saving of capital as well as a lesser depreciation load in succeeding years. In addition it would have the desirable effect of helping flatten out the business cycle by providing employment when it is most needed.

But expansion during periods of slack business requires more than a recognition of what is good economics. It takes a lot of hard-headed, two-fisted courage. Last month we heard a little story about a recent

meeting of the board of directors of a certain company. The problem of high building costs was being discussed, and one by one the directors expressed their support of a proposal to table the company's elaborate expansion program until costs came down into a more reasonable range. After the others had had their say, the chairman spoke.

"You are perfectly right about building costs, gentlemen," he said, "but I don't agree with your decision to defer our expansion program. If we wait until costs are down, things will look so bad that we won't have the guts to go through with it."

**So there is the other side** of the question. Still another factor will come in for consideration in many instances. It might be called the obligation of a producer to his market, and it is illustrated by a statement last month to stockholders by Chairman Robert E. Wilson of the Standard Oil Co. (Indiana). Dr. Wilson announced that the Standard management had decided to proceed with a \$175,000,000 capital expenditure program in 1947 despite high construction costs. His reasons were that the company's facilities had fallen far behind the growth in demand for its products, that this situation was industry wide and therefore could not be alleviated from other sources. Furthermore the urgent and widely recognized need for conservation of oil resources required immediate expenditures to protect future supplies.

The point we are trying to make is that there is no blanket answer to the expansion question. Managements must weigh each project in the balance of cost versus need, with perhaps some consideration of the psychological obstacles that are almost sure to find their way into the picture if action is postponed. But regardless of the decision to go ahead or hold back, there is one thing that can and should be done during a boom, and that is to make sure that the plans for the needed expansion are worked out in detail while the evidence for its need is close at hand.

## The Buyers' Market

BY THIS MONTH A FEW CRACKS have appeared in the surface-smoothness of our "prosperity." Signs which were barely discernible a short time ago have become clear and unmistakable. There is now no doubt that keenly competitive days are in the immediate offing.

Although the chemical industry has not been seriously affected as yet there will be repercussions within the next few months. Makers of tires, textiles, leather and soap have experienced difficulties. Some have cut back on production as output pushed far ahead of orders and as inventories piled up. Others pared prices in an effort to bolster business. It is inevitable that these actions will be felt by chemical makers, for all these industries are major chemical consumers.

What most chemical manufacturers must realize is that during the past half dozen years of easy business, many companies have overlooked the basic need of organized selling. Sales managers have let their departments become mere order-clearing bureaus—delivery-date specifiers. Salesmen have fallen into the rut of casually calling on customers, in many cases have plainly forgotten how to sell.

Now necessity dictates a change. Effortless order-taking must give way to aggressive, planned merchandising. Salesmen must be re-educated in the elements of obtaining business, must learn how to seek out prospects, how to discuss quality, uses, prices, how to close a deal. Such realignment of thinking will not be easy. But it must be done, and done immediately.

For in the forthcoming competitive period the profits will go to the fit—those concerns having well-founded and efficient development, sales, service, and distribution facilities. Failure to face this plain fact, even for a matter of a few months, can prove to be inordinately costly.

## Does Sales Hold Your Research Purse Strings?

THOUGH DECREASINGLY COMMON, it is still the practice of too many companies to tie the research and development budget to sales in a fixed ratio.

If anything, a period of decreasing sales volume should be the time to consider expansion of research expenditures. There are two principal reasons for this:

First, with a well-organized development team an increase in activity is almost sure to provide more new products and processes at the time when the most profit can be realized, i.e., during the upswing of sales and demand that always follows a general slump.

Second, increased research on possible savings in existing processes, the results of which are much more rapidly apparent, may well provide an immediate strong competitive advantage by reducing the cost of producing current products.

Still another very important consideration is the extreme difficulty of holding a highly-trained and well-integrated research staff together if there are no sound plans for the future or if it is known that the company's policy is to start slashing as soon as sales show a drop.

Tying research costs directly to sales may result in an

improved immediate profit position, but it is usually at the sacrifice of much larger profits at a later date. Planning must be for the long pull, not just for tomorrow's profit and loss sheet.

## Water May Become a Problem

WATER IS ALREADY A precious commodity in a good many parts of the United States. That it may become so in some other sections of the country where it has always been considered relatively plentiful is one ominous conclusion that might be drawn from the continuing study of the nation's ground-water resources that is being conducted by the U. S. Geological Survey in cooperation with state and municipal water agencies. Another, more constructive conclusion, however, is that the perennial supply of ground water is very large, and with wise management and proper distribution of wells even larger supplies can be developed in many areas.

The chemical industry has a large and basic interest in the water supply of the nation. A recent advertisement of the Diamond Alkali Co. states that "more water than the millions of gallons used by the city of Pittsburgh is consumed in the production of Diamond products." A principal reason for the location of the plutonium plant in the State of Washington was that the Columbia River was one of the few sources of fresh water that could supply the amounts needed to cool the piles used in this tremendous chemical operation.

As chemical plant units requiring large amounts of water increase in size, especially if they are in areas where other industrial demands for water are large, more attention will have to be paid to stretching the available supply. There are several ways in which this can be done: by use of subterranean reservoirs; re-use of cooling water by passing it through cooling towers; use of salt water where possible when the plant is located on the seashore; throttling of flowing wells; and some others.

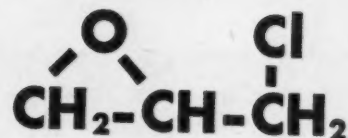
In every case, available water should be thoroughly investigated before a plant site is decided upon and should not be taken for granted, even though the requirements may be moderate. Recently steel mills located on the lower reaches of the Mahoning River in Ohio were forced to close for a short time during the low water season. The amount of waste heat poured into the river by mills at the headwaters raised the downstream temperature of the water to a point so high that the lower mills could not operate.

Chemical processing plants in many parts of the country will have to pay increased attention to their source and use of water if they are to continue to have an adequate supply of this renewable but exhaustible raw material.

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AFTER NINE MONTHS OF INTENSIVE RESEARCH, Navy scientists have been unable to find a sufficiently powerful decontaminating agent to render vessels used in last July's atom bomb tests at Bikini safe from radioactivity.

FROM SHELL CHEMICAL



PHYSICAL PROPERTIES OF PURE EPICHLOROHYDRIN

Spec. Grav. 20/4°C  
Refr. Index 20/D  
Boiling Pt. (760 mm)  
Flash Pt. Open Cup

1.1807  
1.43805  
116.11°C  
105°F

TYPICAL PROPERTIES OF COMMERCIAL PRODUCT

Purity  
Spec. Grav. 20/4°C  
Refr. Index 20/D  
Water

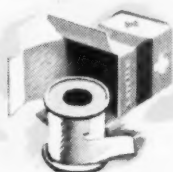
98% by wt.  
1.179-1.184  
1.4370-1.4390  
0.1% by wt.

AN INTERMEDIATE FOR THE INVENTIVE MIND

# Epichlorohydrin



DYES  
SURFACE-ACTIVE AGENTS



ADHESIVES  
FUMIGANTS



PHARMACEUTICALS  
HUMECTANTS



COSMETICS  
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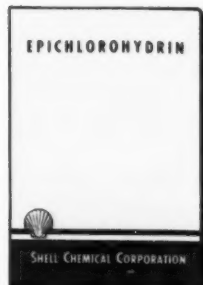
LOOKING for a compound that lends itself easily to new applications and improved processes?

Epichlorohydrin is extremely reactive and highly versatile. It can be used, for example, in the synthesis of numerous compounds having different combinations of the epoxide ring, chlorine atom, ether linkage, hydroxyl group and ester structure present in the same molecule.

Commercially available since our new Houston plant went on-stream, Epichlorohydrin already has been used successfully as an intermediate by manufacturers of *adhesives, dye stuffs, plasticizers, stabilizers, cosmetics and pharmaceuticals.*

Perhaps you have some ideas or product needs which could best be served by Epichlorohydrin.

Inquiries are invited from manufacturing and research chemists.



*Suggested reactions with water, acids, alcohols, phenols, mercaptans, ammonia and amines are described in Technical Booklet SC: 46-3 (shown left). Write for it.*

*Among the many other products manufactured by Shell Chemical are: Allyl Alcohol, Allyl Chloride, Glycerol Dichlorohydrin, Acetone and Diacetone Alcohol.*

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## Quiz kid



This sample bottle of CSC Alkaterge-C is on its way to answer a question. Somewhere, a manufacturer wants to know if this oil soluble surface-active agent can do a job for him. He will put this chemical specialty through a practical test in his own laboratory. If it solves his problem as promptly as many CSC samples do, it will soon be followed by gallons and drums.



A request for such a sample is frequently the first step in making familiar products better, and new products possible.

COMMERCIAL SOLVENTS CORPORATION • 17 EAST 42ND STREET, NEW YORK 17, N. Y.

# What's new

## BUSINESS ON A NEW TACK

**Postwar readjustment has finally arrived. The changes wrought in business run through every department from engineering to sales. Competition is the expectation.**

BY THIS MONTH the signs were clear: the nation's economy was catching up. Reconversion, shortages, inventories, orders—all were catching up. And, in the process some businesses were being caught up; failures were rising sharply.

The chemical industry hadn't felt any major jolts, but there were a few little jabs. Such big chemical consumers as textiles and leather were running in low gear. Glass containers had "levelled off" and many plastics molders were finding the going very rough. In some of these lines firms were swapping excess inventories among themselves instead of ordering.

In spite of these little pinches the chemical industry was outwardly calm. The volume of business was large and most of the companies were so well diversified that a few ripples in one or two markets didn't bother much. Too, the industry had a tremendous development momentum. Many new products hadn't begun to meet market demand and still others of great promise were emerging from the laboratories.

### Behind the Scenes

But the outward calm doesn't quite hide the fact the business problems are changing. A few months back inventories were what people wished they had. Now many look at them askance. The purchasing agent's job was changing from one of grabbing all he could get at almost any price to one of close scheduling and hand-to-mouth buying.

The credit departments had jobs to do again. The halcyon days when every customer had plenty of money were gone. The "normal" days of business failures and slow paying accounts were returning.

Rising costs all along the line have made the requirements for working capital greater and pushed the "break-even" point higher. Thus there were new problems of finance and of cost cutting. More money was being held in the business, or borrowed, to provide the needed liquid

assets. Engineers were busier than ever on schemes to increase efficiency and decrease manufacturing costs.

Perhaps the greatest change of all was that taking shape in the sales departments. Gone were the days of avoiding customers and prospects; of making excuses for the inability to deliver. Back again were sales conventions, pep-talks, quotas, contests and prizes. Old salesmen were being refreshed and new ones recruited and trained. Technical men fresh from the colleges and from other departments of the business were being groomed for the sales department.

Competition was already keen in some lines. Everyone seemed to be sure that it would soon rule in all lines.

## PVC NEAT

**Polyvinyl chloride-plasticizer pastes are quicker and slicker for some resin applications than solutions or emulsions.**

"FREE from all admixture, adulteration, or dilution. Free from what is unbecoming, inappropriate, or tawdry; . . . free from bungling; adroit; . . ." Thus, in part, does Webster define "neat," a neat adjective to describe what appears to be a development of far-reaching importance in plastics technology.

Last month, in B. F. Goodrich Chemical Company's technical service laboratory, next door to the Cleveland offices, technicians were spreading red and blue pastes into Dowmetal molds. After a few operations the materials emerged as plastic key rings for distribution at the plastics exhibition in Chicago.

Thus did Goodrich introduce Geon 100-X-26. It is the first straight polyvinyl chloride paste resin made in this country, although PVC pastes were extensively used by both the English and the Germans during the war.

The resin is a free-flowing white pow-

der, of 8-10 microns mean particle size. It is polymerized in such a way that it can be blended with a liquid plasticizer (usually dioctyl phthalate), in the proportion desired in the finished resin, to a relatively fluid paste. The paste is used in any of a number of ways and then heated to 165° C., whereupon the plasticizer is absorbed and a homogeneous plastic is obtained.

### No Water, No Solvents

Pastes offer several advantages over other modes of application, particularly



**NEAL BURLESON:** Plastic key rings, key to new plastics technology.

for textile coatings, claims Claude Alexander, coordinator of Goodrich's plastics developments. Emulsions contain water and dispersing agents; the water shrinks fabrics, and the dispersants, deposited with the resins, make the coatings water-sensitive. Solutions employ expensive, hazardous solvents for which recovery equipment is required.

The pastes, which are 100 per cent non-volatile, can be applied by spreading, dipping, casting or spraying. Simple equipment is used, and coatings compare with those obtained by calendering. It is not necessary to use copolymers, so the high tensile strength of straight PVC can be taken advantage of. Molding, too, is possible at extremely low pressures.

### Out of the Pilot Plant

Metal objects can be resin-coated by dipping: the metal is preheated and

thereby converts a film of paste to resin. Length of dip determines thickness of coating.

Paste resin is still in the pilot-plant stage. Improvements are still being wrought. The future may well see wide adoption of this technique in the plastics fabricating industries.

## REVIGORATED ROSIN

**A recently developed continuous still holds promise of improving the competitive position of the gum naval stores industry.**

FOR A FULL 150 years the production methods of the gum naval stores industry have changed but little. Crews of men still slash pine trees, collect the exuded gum, and boil and stew their take—batch by batch—in small stills. Thereby they extract the gum's two valuable constituents: turpentine and rosin.

But rosin and turpentine competition has been keen, and processors have realized the need of paring production costs. So, this season, when a novel continuous still went into trial operation in Florida, the development attracted more than a little attention. Its promise of reducing steam and labor costs may be the answer to the industry's most pressing problem.

### Less Labor and Limping

The development could hardly come at a more opportune time. Over the years naval stores producers have been badly buffeted. Labor constitutes a high percentage of manufacturing costs, and as the south has become more industrialized, manpower has become scarce and dear. Too, wood rosin and wood turpentine makers have corralled a substantial share of a market which formerly belonged exclusively to gum naval stores concerns. (The so-called "wood" products are made by a comparatively small number of large operators who maintain sizable, well-designed plants for the extraction of rosin, turpentine, pine oil, dipentene, etc. from pine stumps, shavings, and topwood.) Actually peak gum output was in 1908 and just before the war the industry was limping along with government assistance.

### Bolstering a Big Business

Nevertheless, gum naval stores still represent big business: Output of the industry amounts to some 700,000 barrels of rosin and 250,000 drums of turpentine annually. Moreover, "turpentine" is a major farming industry, in which some 50,000 men are employed, and, as such, comes within the purview of the Department of Agriculture. Hence, the USDA has long paid special attention to naval stores problems, has conducted much research with a view to bolstering the industry's position.

From time to time the USDA, under

the direction of Louis B. Howard, has helped with reforestation, promoted methods of upping gum yield by breeding particular types of trees and by sulfuric acid treatment of "turpentine faces" (tree wounds). But these advances were all designed to provide more pine gum, did not solve the problem of reducing the high cost of batch processing. It was obvious that unless such processing costs could be pared the industry could make no real progress. So the USDA began to study continuous processing techniques.

### Out of the Laboratory

Intensive research on the project began three years ago at the Bureau's Naval Stores Research Division, Olustee, Fla. There I. E. Knapp and George P. Shingler designed a small, inexpensive, continuous still. Early tests were promising, so they built a larger unit, and this season the new still was placed in semi-commercial operation.



**LOUIS B. HOWARD:** No more boiling and stewing.

Simplicity of design is perhaps the outstanding feature. Essentially the still is a standard eight-inch pipe (or upright column) about 20 feet high, surmounted by a large bowl, or "flash chamber." In addition there is a preheating coil to warm the gum before it enters the still, a condensing tank to liquefy turpentine vapors, and suitable outlets for both rosin and turpentine.

In operation the gum, preheated to about 350° F., enters the flash chamber through a spray nozzle, and from this chamber about 80 per cent of the turpentine is flashed off. The nonvolatile rosin flows toward the bottom of the upright, steam-jacketed column, where a counter-current stream of live steam strips off the residual turpentine. Rosin is tapped from the base of the column.

Normally turpentine and rosin start flowing from the still about five minutes after the cleaned gum enters the column, and the experimental equipment produces slightly over a ton of rosin per hour. However, plans are already under way for the construction of larger units, having 10 or 12 inch column, and correspondingly greater productive capacity—perhaps close to the 4000 pound per hour output of conventional batch stills.

At present USDA scientists are enthusiastic about the prospects, point to the savings which are realized by continuous processing. Labor costs are naturally reduced, for there is no time consumed in charging and discharging batches. Too, the continuous unit uses a third less steam than batch stills of the same capacity, and the entire operation can be handled by one man. Quality of the rosin is fully as high as by batch processing, and in some respects it appears to be superior. And, of primary importance is the simplicity of design, so that the unit can be assembled at moderate cost from standard equipment.

### Industrial Promise

The observations are as yet preliminary, but they hold promise. It may well be that the continuous still will enable the gum naval stores industry to meet the challenge of rugged competition.

## INSECTICIDE

It is no secret that the Insecticide Act of 1910, under which the Department of Agriculture has regulated the marketing of insecticides in Interstate Commerce, is outmoded. And for some years now efforts have been made to modernize the law, broaden its scope, to render it workable.

And, last month, new legislation, introduced by Rep. August H. Andresen, was passed by the House and sent to the Senate. It endeavors to bring the law up to date, holds promise of stimulating other State-implemented regulations.

Primary feature of the new Andresen bill is the extension of Federal control to fungicides, rodenticides, and weed-killers. Other features: It requires that full and accurate information be provided on labels attached to all economic poisons, and before any poison can be marketed the manufacturer must register his label with the Secretary of Agriculture. Registration is valid for five years, renewable for successive five-year periods. It is also provided that artificial coloring must be added to certain compounds to provide a warning against consumption by humans.

During the past year the main features of the Andresen bill have been endorsed by insecticide makers. Now both government and industry supporters are hopeful that its enactment will stimulate development of uniform State legislation covering intrastate sales.

## BALL-BEARING ENAMEL

**Spred-Luster, Glidden's water-emulsion enamel, is capturing a healthy share of the interior gloss enamel market.**

LIKE many another recently introduced product, water emulsion enamel was born of military necessity: The Army wanted a camouflage paint that could be shipped anywhere in the world in concentrated form (to save shipping space) and be diluted for use with anything the men could lay their hands on: gasoline, sea water—anything liquid. Special thinners were out of the question, for shipping them would undo the advantage of concentrated paints.

The Glidden Co. worked with the government and developed a paint that would stand up to six months' exterior exposure, and from that research has come commercial products. Heading up the research is Phil Herzog, who wrote his thesis on emulsions and is now turning his school-gained knowledge into practical channels.

### How it works

Water-emulsion enamels are formulated very much like ordinary enamels except that the tung oil-alkyd resin-pigment mixture is dispersed in water with the help of a protein obtained from soybean meal. The globules of dispersed enamel are so small that Brownian movement can be observed in a drop of the dispersion under a microscope.

The water "lubricates" the oil droplets so that brushing is simpler than with conventional enamels. As the water evaporates, the oil globules coalesce into a continuous, coherent film.

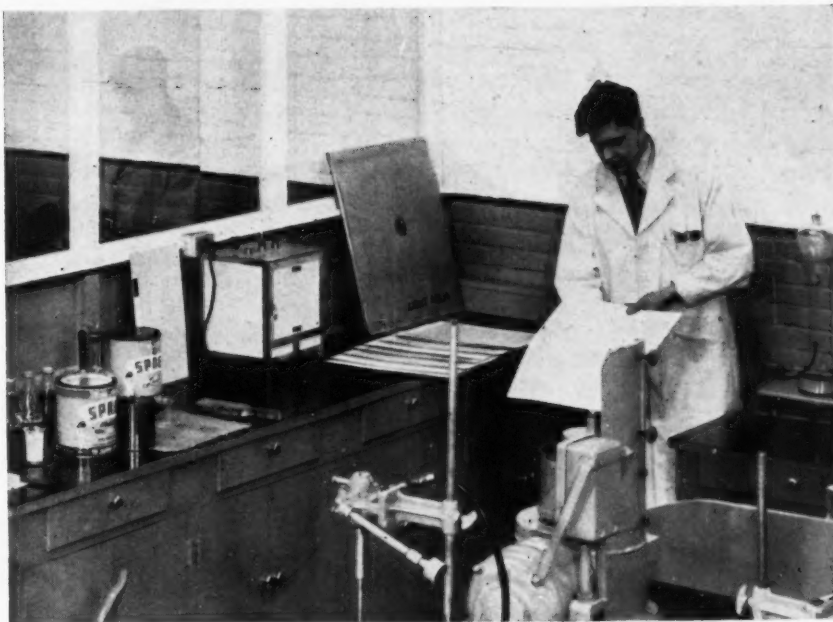
The surface goes through a stage of looking pretty grim before the oil particles come together. "I get scared every time I see a job before it's dry," said L. S. Fulton, Glidden's director of regional distribution. "It really looks terrible. But then the water evaporates and the enamel forms a smooth, uniform coat."

### Tough problems encountered

It seems strange that such a comparatively simple idea as emulsion enamels wasn't hit upon earlier. But theory is easier than practice, and some obstinate problems had to be licked.

First, a practical emulsifying agent had to be found. Here Glidden's diversified research—which extends from vitamins to metal powders—gave it an edge. From soybeans it had developed alpha protein, which proved ideal for the purpose.

A tougher nut to crack was the development of a neutral enamel. Conventional enamels are acidic, but these couldn't be emulsified properly for the acids reacted with the protein. The solution of this problem delivered a bonus: The new enamel is inert to alkaline surfaces (such as plaster) and gives a bet-



PHIL HERZOG: He's painting the world with water.

ter coat over them than conventional enamels.

There was practically nothing in the books about these emulsion problems, and the laboratory men were ready several times to throw up the sponge.

### Production proceeding apace

Output started at 80,000 gallons a month, said Mr. Fulton, and is now 100,000. It would be higher except for the bottleneck in titanium dioxide.

Glidden never dreamed of some of the uses to which it is being put: cloth and leather coatings, cinder block spray in milk houses, primer coats under conventional enamels.

Working in Spred-Luster's favor, pointed out Mr. Fulton, is the present high cost of painting labor. "A lot of people just can't afford to hire painters and consequently are doing their own work." Ease of application is winning more and more house-owners to water-base paints.

The present supply-demand picture is so distorted that it is hard to draw any valid conclusions on the relative status of conventional and water-base paints. Demand for both types outstrips productive capacity, and the ratio in which they are produced is largely arbitrary. Although the production ratio doesn't mean much, the demand ratio is important: Glidden's dealers report that roughly a quarter of the demand is for the water-emulsion products.

### Popular Appeal

Spred-Luster suffers from an overabundance of one virtue: it spreads easily, and novices brush it out too thin. Glidden is instructing dealers to warn buyers to use the quantity recommended on the can—and not try to paint the whole house with one gallon.

What do professional painters think of it? Their enthusiasm is not boundless. Like the spray gun and large-size brushes, it gets too much work done too soon!

## ANTI-ALLERGY DRUGS

New anti-allergy drugs are opening a field of chemotherapy which may become as important to the pharmaceutical industry as that opened by the sulfa drugs. The most prominent substances are Benadryl, product of Parke, Davis & Co., and Pyribenzamine, product of Ciba Pharmaceutical Co. Both are complex organic chemicals, the latter apparently being derived from earlier French work which showed that related compounds had marked ability to block the effects of histamine.

Histamine is a natural derivative of one of the amino acids which make up the body's proteins, and is believed to be responsible for the typical swelling and blisters accompanying many skin rashes, the inflammation of eyes and nasal mucosa, and the changes in blood pressure associated with allergic reactions. It is estimated that at least 15 per cent of the population suffer from some form of allergy, including perhaps 10,000,000 hay fever victims. If all types of allergy are considered, the new drugs give 60 to 70 per cent of the patients relief from local reactions for four to six hours.

When patients become sensitized to sulfa drugs, penicillin and streptomycin it is a general rule not to administer them again. However, the anti-histamine drugs may make repeated use possible in such cases.

These drugs may also prevent the shock reaction following injection of a serum to which the patient has previously acquired a considerable degree of sensitivity.

## BREEZE AND TIDE

**Two new packaged detergents of unique composition are being test-marketed prior to nationwide distribution.**

DURING THE war anything that resembled soap, and had any slight promise of being able to do a cleaning job, was snatched from the shelves by eager housewives. Then it was that synthetic detergents managed to make a real inroad into the household cleaner market. But the question remained: What share of the business would the synthetics be able to retain when soap supplies, and prices, became more normal?

Those of the old school regarded the newcomers disdainfully—as mere soap substitutes. They maintained that synthetic sales would dwindle as soon as competition became keener. Makers of synthetic detergents held the opposite view, talked confidently of attaining a billion pound per year sales volume.

### Big Three Set the Pace

By this month there were weighty arguments to support their confidence. Two of the "big three" soapmakers (Procter & Gamble, Colgate, Lever Bros.) introduced new cleaners, both of them synthetic products, and pushed hard for national distribution. This development placed all three soapers in the synthetic business: Procter & Gamble has sold Dreft for some years and Colgate-Palmolive-Peet has established its product, Vel. Lever, however, has remained aloof.

First of the two new products to hit the market was Tide, an all-purpose product for the family wash, packaged and distributed by Procter & Gamble. Last January P. & G. began spot-marketing Tide in three selected areas in New York State, Kansas, and Massachusetts. It met ready acceptance and recently the company began to extend marketing areas, planned national distribution.

### High Phosphate Content

Tide is in a sense a companion product to P. & G.'s Dreft, which is sold for dishes, glassware, and delicate fabrics. Packaged in a red, yellow, and blue container at 33 to 38 cents for 18 ozs., Tide sails under the slogan of "Tide's in—dirt's out."

A unique feature is its composition: Synthetics normally carry a high concentration of sodium sulfate or sodium chloride, and a very small percentage of phosphates. Tide is reported to contain well over 50 per cent phosphates.

Breeze, Lever Bros.' first entry in the highly competitive field, is now being test-marketed in six midwestern cities. The promotion is being supported by a heavy-artillery advertising campaign—radio, newspapers, billboards, and a plenitude of point-of-sale material. It is being

pushed as a dual-use product—for dish-washing and fine fabric laundering. Copy themes include such neat phrases as "mountains of gentle suds that last and last"; "dishes sparkle—no wiping!" The 8¾-oz. package sells for about 35 cents.

### Dow's Interest

The active component of Breeze is said to be a new compound which, after considerable shopping around, Lever arranged to have Dow manufacture.

The appearance of Tide and Breeze on the scene now rounds out the picture. All three of the big soapmakers are ear-deep in the synthetic detergent business.

That there will be real competition there can be no doubt—nor of the fact that the synthetics are here to stay.

## TOO MUCH TRI

**New process tricks suppress formation of trimethylamine, lower costs of desirable mono- and dimethylamines.**

BACK in 1934, when Rohm & Haas Co. started making methylamines, the fair-haired boy of the trio was the middle one: dimethylamine. Superior to sulfides in that it has a very mild action on the hair and also produces a fine-grained leather, it immediately found wide use in the un-hairing of hides.

Chemical reactions, unfortunately, do



**RICHARD S. EGLY:** He tilts at a white elephant.

not always bend to the will of man, and the reaction of methanol with ammonia to give methylamines is a case in point: The reaction product is a conglomeration of unreacted methanol and ammonia, water, and the three amines. Separation is difficult: First of all, the boiling points of the three amines are all within a 12.5° C. range, and—adding insult to injury—trimethylamine forms a constant-boiling mixture with the mono and di and ammonia.

Villain of the piece is trimethylamine. Mono and di both find favor in industry's eyes, but tri is a drug on the market.

### Trimming the Tri

It is hardly a shock, then, to learn that producers have been looking for ways to suppress or eliminate trimethylamine formation. Although Rohm & Haas is still by far the largest producer, Du Pont and Commercial Solvents have also entered the field; and Commercial Solvents' R. S. Egly and E. F. Smith have reported on their company's research leading to solution of this problem.

One technique—the most obvious approach—is to vary contact time, temperature and pressure. Under certain conditions tri formation can be considerably suppressed. A second means is to add water to the reaction mixture; tri is cut down with little effect on production of mono and di. Also, further data were obtained on a procedure, previously patented, where the over-all production of tri is reduced by recycling it through the reactor.

### Lower Price for the Others?

Commercial Solvents is mum about plans to exploit any of these techniques, but application of them should result in cheaper mono (now 32¢ per lb. in tanks) and concomitantly less expensive products for which it is a raw material. Among these are the important synthetic detergent, Igepon T, which is the reaction product of stearic acid and methyltaurine (methylaminoethanesulfonic acid); Thiurad and the Tuads (tetra methyl thiuram sulfide)—rubber accelerators; and Metol, or Elon, the photographic developers made by the reaction of monomethylamine and hydroquinone. During the war mono was an essential intermediate in the manufacture of the explosive, tetryl, which is the nitrated reaction product of monomethylamine and dinitrochlorobenzene.

Cheaper di (now 36¢ per lb.) will result in lower-cost derivatives, chief among which are quaternary ammonium compounds and the plasticizer, dimethyl stearamide, which is especially good for the burgeoning polyvinyl butyral resins.

## CH. E. STANDARD SYMBOLS

Chemical engineers can now talk a common sign language. The American Institute of Chemical Engineers and the American Standards Association have jointly announced the first standard set of symbols for use in chemical engineering calculations.

Known as American Standard, ASA Z10.12-1946, "Letter Symbols for Chemical Engineering," the new standard is available in reprint form at 50 cents a copy from A.I.Ch.E. headquarters, 50 E. 41st St., New York 17, N. Y.

The standard is being adopted by CHEMICAL INDUSTRIES and most of the other American chemical publishers.

## RIGHTS AND REMEDIES

**The Lanham Act, which becomes law next month, offers broader trademark protection.**

THREE THOUSAND years ago the primitive artisan began to brand his handiwork with his own characteristic symbol. Were he a potter, painter, or tanner, as soon as he had completed his task pride impelled him to impress his own identifying mark on his creation. Over the centuries—as trade flourished—such inscriptions have come to represent quality, to serve as a type of guarantee.

Today we call them trademarks—"words, letters, or symbols used in connection with merchandise which point distinctly to the origin of the article to which they are applied." But it was not until the last century that trademarks had any legal status, came under the protection of the courts and assumed the status of business assets.

### Insecure Foundation

Nevertheless, in spite of the progress which has been made, the laws governing trademark practice have been anachronistic, have not kept pace with the modern needs of trade and commerce. And, even though businessmen have long been aware of the shortcomings of trademark legislation, by and large the precepts of the out-moded Act of 1905 have governed brandname protection.

After eight years of Congressional discussion a new Act was passed last July, and next month it will become law. This legislation—the Lanham Act—is designed not only to preserve what is good in existing legislation, but further, to strengthen and liberalize the law. In essence it will both modernize and simplify trademark practice.

It is freely admitted that the Lanham Act is not perfect, but the consensus is that it does represent a major advance over existing legislation (mainly the Acts of 1905 and 1920, plus amendments scattered confusingly through U. S. statutes). One of the most concrete advantages it embodies is the placing of all trademark matters under one law.

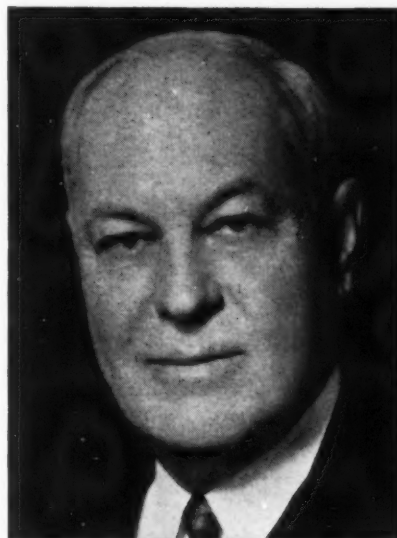
### Important Incentives

Of real worth is the material incentive the Act provides for trademark registration. Heretofore many a company didn't bother. If another concern started using its name the first company could always stop the infringement by establishing prior use—even if it had never registered the tradename. This has meant costly headaches for many corporations, has led to exploitation of legitimate operators by fly-by-night tradename pirates.

Whenever a new product was launched the legal department of any nationally-operating company had to institute an expensive search to determine whether

the proposed name was already in use. Often it would locate a few small concerns using such a brandname, buy up the rights, and feel that it was in the clear. Later, after the company had invested heavily in promotion, it might hear from another locally-operating concern, be faced with infringement claims and costly law suits.

The Lanham Act should obviate this possibility. If a locally-operating or-



**FRITZ LANHAM:** "Fraud and deceit . . . rights and remedies."

ganization does not register a trademark it will still have rights to the name, but only in the section of the country in which it has been doing business. It can no longer threaten the national marketer. Furthermore, any company will be able to tell at a glance—through a national registry—whether a name can be substantially its property. It may mean steering clear of special territory but it cannot be harassed.

### Federal Stature

An important feature is that trademarks come only under federal jurisdiction. Thereby are avoided such complications as threatened in the early '30's when several states considered compulsory registration of trademarks. Broader coverage is provided also, for, apart from product names, slogans and distinctive features of advertising can also be insured.

A flaw of earlier legislation will be eliminated. Heretofore all marks were good for 20 years. As a consequence the files of the U. S. Patent Office are crammed with names no longer used. The Lanham Act should clear out this deadwood. All tradenames will die within six years unless actual use is proved, or a substantial reason is provided by the registrant justifying non-exercise of his prerogative.

Although the basic problems of both promoting and protecting a trademark or

brandname remain the same considerable task they always have been, the new Act provides, in the words of Hon. Fritz Lanham, "a means to protect persons engaged in commerce against unfair competition, to prevent fraud and deception . . . to provide rights and remedies. . . ."

## SPEED-DRY INKS

**Visualizing a new approach two chemists uncovered a tremendous potential market for glycols.**

SOME FEW years ago Don Erickson and Paul Thoma took a sharp look at the printing ink industry. They discussed conventional formulations and printing methods and reached a conclusion: A field of substantial promise existed for better inks—inks which would be odorless, dry faster, and yield a hard, brilliant finish.

By 1941 their research program had borne fruit—patent 2,244,103 was issued to Erickson and Thoma, and assigned to the Michigan Research Laboratories, Kalamazoo. It covered the manufacture of steam-setting inks. Now there are some 30 licensees of the Michigan patent all scrambling for a share of the rapidly expanding market. (Assets of Michigan Research were acquired by Sun Chemical Corp. in 1945, and the concern now operates as a Sun subsidiary.)

And chemical producers are following developments closely, for indications are that the new inks will mean a market for some 75 million pounds of glycols annually.

### A Novel Principle

Standard formulations for printing inks have long been paint-like. Most ordinary inks dry either by evaporation of the solvent, or oxidation of the vehicle. But Erickson and Thoma took advantage of a different principle. Their inks are resin-pigment-glycol combinations and the basic requirement is that the resin (usually an alkyd) must be soluble in the glycol and a limited percentage of water, but insoluble in the glycol and an unlimited quantity of water. Thus they are stable until the water percentage is upped—and this can be accomplished by steam-treating the freshly imprinted material, or merely printing in a high humidity atmosphere. They set speedily, and they are odorless.

### No Odor

Main acceptance of the steam-setting inks has been by the food packaging industry. Odorless as they are, the inks are ideal for printing milk cartons, sugar bags, and so forth. This represents a substantial market in itself, but it is even greater than it would appear at first glance. When presses are set up to imprint sugar bags, for instance, the ink is not changed to imprint cement bags, or

other non-food packages. So glycol inks have garnered a heavy share of the total container-printing business.

But more important are the results of pilot plant studies made in the publishing field. Ink manufacturers are chary of committing themselves on either the results or the prospects, but they acknowledge that experiments have yielded some highly encouraging data. There is no doubt that most manufacturers regard this field as exploitable, and many are not talking more freely at the moment purely because pigments are in short supply.

#### Which Glycols

Which glycols will be used in greatest quantity by the steam-setting inks is not as yet determinable. Recently formulations have been based more on the degree of availability of the glycol than its price, or characteristics. Many inks contain mixtures of several glycols—running from ethylene on up to triethylene, propylene, and so forth.

Glycol makers, of course, are keenly interested in the growth of this new consuming industry. For an estimated 50 to 75 million pound additional demand for glycols is not to be discounted. Back in 1945 total glycol output stood at 205 million pounds; by 1948 with expansions and new entrants (Jefferson, Wyandotte) the U. S. should have a productive capacity of slightly over 400 million pounds.

And the 75 million pounds which steam-setting inks may well consume would represent almost twenty per cent of total glycol output.

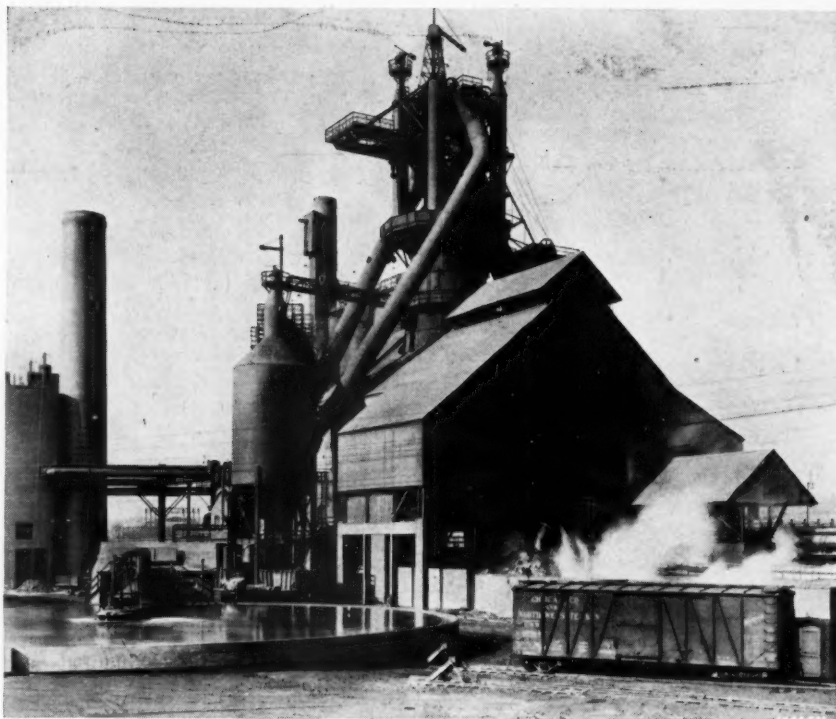
## CERAMIC METALS

**The marriage of metal powders to ceramic oxides in the oxy-acetylene flame produces a refractory, heat-conducting offsprung.**

A MENACING hurdle in the path of gas-turbine development is the difficulty of finding a material for the turbine blades which will stand up under the terrific heat generated in the combustion.

At Ohio State University's Engineering Experiment Station a possible solution to the problem is being worked out: Research Professor of Ceramic Engineering George A. Bole has succeeded in fusing metal powders and ceramic bodies into a union which partakes of the virtues of both. The ceramic-metal combination is strong and heat-conductive, like metal, and capable of standing up under extremely high temperatures, like ceramics.

Helping in the studies at the Station is an oxy-acetylene fired furnace which can be heated to 4500° F. Another ingenious device is a combination torch-spray gun into which is fed oxygen, acetylene, metal powder and metal oxide dust. Emerging from the business end is a molten ceramic-metal spray which can apply to metals and other materials a coating of the same desirable properties.



CLEVELAND NO. 5: "A sweet furnace."

## SUPERCHARGED PIG

**A recent development in blast furnace technology revolutionizes pig iron production, looms as a factor in the coal tar vs. petroleum chemical contest.**

FOR SEVERAL MONTHS Republic Steel has been proving on a big scale the manifold advantages of operating a blast furnace under pressure. Pig iron manufacturing costs are cut by more than a dollar per ton (nearly \$1.50); coke consumption is decreased 12%; furnace capacity is increased 20%; flue dust is minimized, and iron quality is improved. But these established gains are merely the beginning—still greater advances await only the delivery of new equipment and the completion of further experiments.

#### The Idea

The idea of pressure operation for blast furnaces is not new. It has been fighting for a trial for a long time. Nearly a century ago pioneer steelmaker Bessemer obtained a patent describing some of the features of pressure operation. In the late 1920's a chap named Edwards with Bethlehem Steel tried increasing furnace top pressures up to 3 p.s.i. Somehow the idea never really took hold. Eventually, however, even these modest pressures became normal operation as furnaces grew bigger and the dust-collecting and gas-washing trains became more complex.

#### The Man

The full conception of pressure operation as it is now practiced is due to Julian Avery. Chemical engineer Avery evolved the idea while working on metal-

lurgical problems for the Electro Metallurgical Co. (U.C.C.). Since the exploitation of blast furnace improvements did not fall into that firm's province, Avery took the idea to Arthur D. Little, Inc. This was in 1936. A patent application was filed and subsequently the patent granted in 1938 was assigned to Little.

#### Experts Disagree

Then there followed a long and discouraging period of ringing the steel industry's door bells. No buyers were found—no one even wanted to try pressure operation on an experimental basis. The experts disagreed. The great majority said it wouldn't work, suggested that it might even do the opposite to what was claimed of it.

But, Julian Avery kept on trying and when the war brought the need for more iron and steel production the operation of blast furnaces under higher pressures was reviewed. Again it suffered many setbacks, but this time it found influential support from two men on the War Metallurgy Board. An old Avery crony from Electromet, Jim Critchett, and an enthusiast who had read Avery's earlier papers on the subject, Tom Joseph, urged a trial.

Once again the industry was canvassed. This time Republic Steel, which had been overlooked on the first round, agreed to make the test. Said Joe Slater, assistant manager of Republic's Cleveland district. "I'll try anything once in a blast furnace." So in 1944 the first test was made, going all the way from a paper idea to the world's biggest blast furnace.

#### A Long-Sought Trial

Because of a few minor difficulties, and the need to get on with production, the

test was of short duration and the results inconclusive. The data proved your point no matter which side you were on. But, Joe Slater believed in pressure operation, and his furnace men had had a taste of the smooth performance it provides. Said the operators, "We don't give a damn what the data show, this is a sweet furnace." Nevertheless, further trials had to await the end of the war. With an earlier trial, and a little more luck, pressure operation might have obviated a major portion of the war-time blast furnace expansion and eased the critical shortage of coke.

#### Down to Cases

After the war Republic went after pressure operation in earnest. Since last August it has had two furnaces operating at top pressures of 10 to 12 psi. (normal 2 psi.). Only minor changes were required to achieve these pressures as the blowers on both furnaces had sufficient excess capacity. A few improvements in the charging hopper and the gas washer ironed out difficulties that marred the wartime test.

Just why pressure operation works is the subject of some clear-cut factual data and considerable theorizing. The data now prove that Julian Avery was right 11 years ago, but for a long time theorizing held up a trial. Perhaps that's what prompted P. H. Royster, with the O. P. R. D. at the time of the first test, to observe that the primary requirement in any furnace study is to "take sufficient data to prevent theories from creeping in."

#### How and Why

But now the data show that pig iron capacity of a blast furnace is directly proportional to the rate at which air is blown into the furnace—to the "wind" as furnacemen say. However, as the

"wind" is increased at normal pressures the velocity of the gases passing through the furnace increases. And, the data show that increasing gas velocities adversely affect the consumption of coke per ton of pig iron produced; drastically jumps the rate at which flue dust is blown over after the velocity passes a threshold limit. Thus, in the past, furnace operation has been a compromise between iron capacity and economy, balanced at an average gas velocity of about 65 feet per second (calculated on the empty furnace).

What pressure operation has done is to permit the blowing of more "wind" at lower velocities, for pressure increases the density of the gases and hence cuts the velocity. Now, for the first time, it is possible to treat air rate and velocity as independent variables. The actual "before and after" conditions in the Republic's Cleveland No. 5 furnace show the magnitude of the changes: Normal operation with a "wind" of 75,000 cfm. ran a bottom pressure of 22 psi. and a top pressure of 2 psi., with the calculated velocity 65 feet per second. Pressure operation with the "wind" at 113,000 cfm. runs a bottom pressure of 30 psi. and a top pressure of 12 psi., the corresponding velocity being about 50 feet per second. The contact time of the reducing gases with the ore has been increased from about 1.5 to 2 seconds. As the chemist would say, "The space velocity has been decreased, the conversion ought to go up."

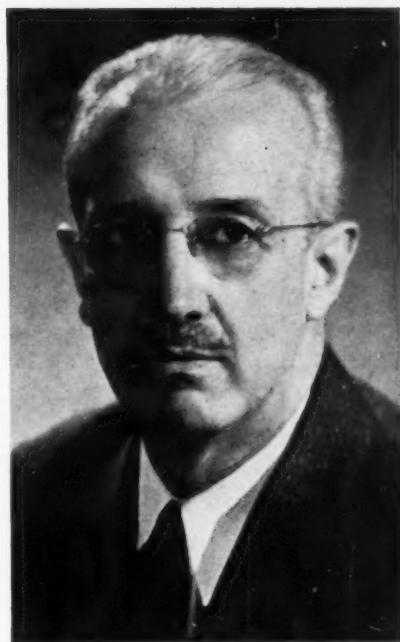
#### Of Things to Come

Great as the present gains are they look more like the beginning, than the end, of pressure operation development. Republic now has on order the biggest blast furnace blower ever built. It will deliver 125,000 cfm. compressed to 40 psi. This new blower will permit the testing of still higher top pressures to attain further increases in pig capacity and further reductions in coke consumption.

And, this month tests are being made on a gas turbine run by the expansion of the effluent gases. Under the current operating conditions (12 psi. top pressure) the potential power recovery is 2800 h.p. As pressures are pushed higher even greater power recovery is attainable, not only from the greater expansion possible, but also because higher pressures decrease the pressure drop through the furnace itself. Thus the extra cost of compression may net rather small due to the ascending power recovery factor.

#### Chemical Impact

The development of pressure operation of blast furnaces augurs important changes for both the steel industry and the chemical industry. For steel it means lower manufacturing costs and more capacity at a slight increase in investment. It means better pig iron—less sulfur due to less coke. It means some relief from the present acute scrap shortage, for steel



JOSEPH SLATER: He'd try anything once.

makers require both pigiron and scrap in somewhat interchangeable amounts. With more pig at lower cost this can be an important factor in the face of the current high scrap prices (differential compared to pig now about \$10 per ton). Many other steel companies, both here and abroad, are now planning pressure operation of their furnaces. All this adds impetus to another new steel development—the use of oxygen in open-hearth furnaces—for increased blast furnace capacity must be augmented by more open-hearth capacity before there will be any more steel output.

#### Curtains for Coal Tar?

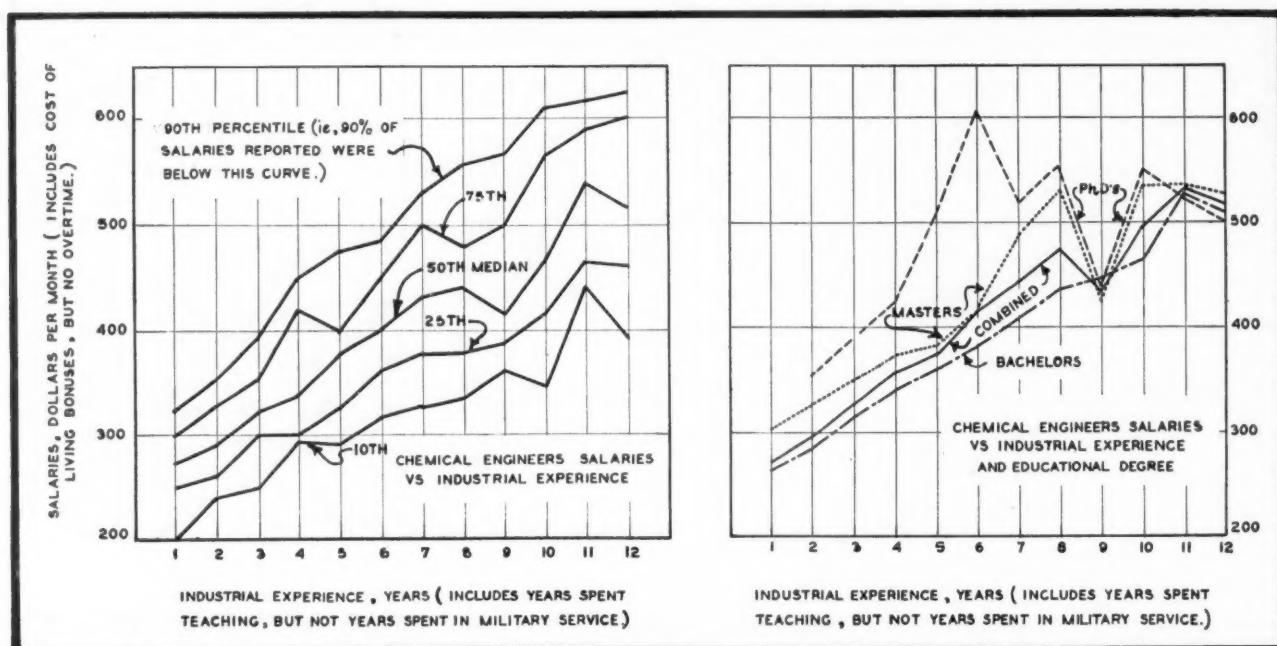
For the chemical industry the coke-saving pressure operation means a reduced supply of coal tar chemicals, the major share of which now come from the steel industry's coke ovens. Perhaps this will only hasten the day when other sources or alternates must be found. For a long time the chemical industry has been finding uses for coal tar products at a faster rate than coke expansion provided basic raw materials. Most of the slack is gone already—it's all gone in some items like naphthalene, toluene, xylenes, and some now see the end near for benzene. The burden of supplying aromatic hydrocarbons is shifting to the petroleum industry.

Today A. D. Little, Inc., is offering licenses to the steel industry generally on the Avery patent (U. S. 2,131,031). Already several large steel producers are planning conversions to pressure operation and still others are actively investigating it. With the ultimate reduction in coke consumption approaching 20% the effect on coal tar chemicals will be considerable: Perhaps 100 million gallons less of coal tar, 25 million gallons less of benzene, 60 million pounds less of naphthalene, and so on.



JULIAN AVERY: He kept on trying.

# CHEMICAL ENGINEERS' SALARIES IN NEW YORK



ANXIOUS TO KNOW THE EFFECT of rising starting salaries for engineering graduates (CI May '47, p 769) on the salaries of young engineers in industry, the Junior Chemical Engineers of New York last month finished compiling results of its own survey of salaries of chemical engineers up to twelve years out of school. The results, as shown by the curves above, seem to indicate that the men in industry are doing a pretty fair job of keeping ahead of the beginners.

The curves are based on 511 returns from a total of 810 questionnaires mailed to members of the Junior Chemical Engineers of New York and junior members of the American Institute of Chemical Engineers located in the New York metropolitan area. The returns were comprised of 315 men with only the bachelor's degree, 156 with the master's and 40 with the doctor's. The curves in the second chart represent arithmetical averages of the salaries of the different educational groups.

## PLASTIC BREW

The itaconic acid molecule is one for the chemist to conjure with. Now Pfizer is planning a plant to make it by a new fermentation process.

YOU MIGHT with perfect chemical propriety call itaconic acid by two other names: methylene succinic acid or carboxymethyl acrylic acid. The former suggests alkyd resins, made from polyhydric alcohols and dibasic acids, and the latter reminds one of the clear, hard acrylic polymers.

Both of these, indeed, are in the repertoire of reactions which itaconic acid can undergo. So promising has this material looked in bit parts, that Chas. Pfizer & Co., Inc., plans to give it a stellar role next year. It will be produced on a commercial scale in a brand new plant using a brand new process.

Formerly made in laboratory lots by thermal decomposition of citric acid (which thereby loses water and carbon dioxide), itaconic acid will be made by Pfizer as the primary product of a new vegetative mold fermentation.

### Self-plasticized Plastics

As mentioned above, itaconic acid can be used as a basis for both acrylic poly-

mers and alkyd resins. Dimethyl itaconate, for example, polymerizes with a peroxide catalyst to a transparent, glass-like plastic showing low shrinkage upon casting. Polyester resins, on the other hand, formed by esterification with dihydric alcohols, have been suggested as synthetic drying oils; and blends with styrene, for low-pressure laminate adhesives. Preliminary tests on oil-modified alkyd resins made from itaconic acid indicate that they have a lower viscosity, bake faster, show less tendency to gel and give finished products with lower acid numbers.

It is interesting to consider itaconic acid as a carboxymethyl acrylic acid: Esterification gives an acrylic ester self-plasticized by its own extra ester group ( $-\text{CH}_2\text{COOR}$ ). For this reason dibutyl itaconate, when used in copolymerizations, softens the product with no danger of age-hardening by loss or migration of plasticizer.

The double bond is interesting, too, for it is conjugated with one of the carboxyl groups and can add sodium bisulfite to give wetting agents of the Aerosol type.

### Not Now But Soon

G. O. Cragwall, Pfizer's technical consultant, emphasizes that tonnage production is not next week's news. Pfizer is now busily building a new plant for some

of its old-line products at Groton, Conn., and not until that is finished—early in 1948—will the itaconic acid plant be started. Even the location—whether in Groton or Brooklyn—is undecided.

Eventual price, too, is a matter for speculation, and Pfizer is unwilling at the present time to speculate. It is not too far-fetched, however, to guess that itaconic acid may move into the maleic and fumaric price range.

If and when that day comes, itaconic acid may stand tonnage-wise on the same level as many other common plastic raw materials. In the meantime Pfizer is offering samples from its pilot-plant output for research and developmental work. Out of these researches may grow a new and improved family of synthetic organic chemicals.

## VANADIUM CATALYST

Vanadium pentoxide, usually regarded as an oxidation catalyst, has been found to be a superior hydrogenation catalyst in petroleum processing.

Previous catalysts have been good at low temperatures or have resisted sulfur inactivation, but vanadium pentoxide is the only one with the double advantage. Olefins and diolefins have been hydrogenated to paraffins at 400° with a vanadium oxide-aluminum oxide catalyst.

## CYANIDE SALVAGE

**Lethal hydrogen cyanide used to be removed from coal gas and burned. Now it is recovered as a valuable by-product.**

CHEMISTS of the Koppers Co. have added another important chemical to the long list of products obtained by the coking of coal. Hydrogen cyanide and its equally deadly companion, hydrogen sulfide, have heretofore been removed from coal gas because of their hazardous nature, but Koppers' new installation now being built at Kearny, N. J., marks the first attempt to recover pure liquid hydrogen cyanide as a marketable by-product.

### Selective absorption the trick

The recovery procedure to be used at Kearny is a modification of the Seaboard process, one of the many processes—a recent publication describes fourteen—for the removal of the two compounds from coke-oven gas.

In the Seaboard process these acidic gases are absorbed in a water solution of soda ash, whence they are stripped by aeration and sent off to the boilers, to be burned as fuel.

In the modified process they are absorbed in the same way. Instead of being stripped with air, however, the solution is heated under vacuum. The effluent gases are passed through another different water solution, which selectively absorbs the HCN. The residual sulfide, of which 6,500,000 lbs. per year is expected at Kearny, will pass to the burners of a sulfuric acid unit. The cyanide—1,200,000 lbs. per year—will be stripped from the special liquor with heat, liquefied and packed in 75 lb. cylinders.

### Where sold

Major uses for hydrogen cyanide at present are as a fumigant for insects and vermin in cotton, flour, and on fruit trees, and as a raw material for synthesis of many intermediates.

Koppers is at present chary of revealing its plans in detail, but doubtless it will initially cultivate the markets mentioned. Nevertheless, industry is not overlooking the possibility that HCN costs will be pared, thereby permitting its entry into other fields of promise.

## SAGLESS PORCELAINS

**Porcelains containing no silica possess unique heat-strength characteristics.**

THE MANUFACTURE of refractory porcelains has long posed many problems, for although many compositions are satisfactory in low-temperature ranges, at higher temperatures they sag. And a

major limiting factor has been the use of relatively low-melting bonds.

In most porcelains feldspar is a main component. It acts as a flux, which with clay and silica, forms a viscous liquid. The liquid fills the interstices between the crystalline phases of the mixture and, upon cooling, forms a matrix of glass. Thus, no matter how refractory the other components (e.g. magnesium oxide, aluminum oxide) are, the strength of the porcelain is largely dependent upon the properties of the bonding glass.

But this month the National Bureau of Standards reported the development of a series of novel porcelains which possess exceptional mechanical and dielectric strength up to 2000° F. The main characteristic of these new porcelains is the absence of silica. A typical composition: 84 per cent beryllia; 8 per cent zirconia; balance lime and alumina. Another, high-zirconia compound contains: 80 per cent zirconia; 10 per cent beryllia; 10 per cent magnesia.

The present products are an outgrowth of experiments which the Bureau initiated in 1940, and for the production of which special high-temperature (3700° F) furnaces had to be designed.

Their major use will be, of course, in those fields where strong, heat-resistant materials are required, such as in spark-plugs, high-temperature electrical insulators, and radar transformers.

And not to be overlooked is the fact that such ceramics are lighter in unit weight than many heat-resistant alloys. That feature alone offers many possibilities—particularly in aviation.

## KNOWLES ASSOCIATES

**A new engineering group specializes in plant and equipment design for the chemical process industries.**

MARSHALLING the experience of a long and successful engineering career with the Dorr Company and more recently the Process Equipment Division of General American Transportation Corp., where he occupied the post of technical director, Dr. Chester L. Knowles last month announced formation of a new process engineering and design group under the name of Knowles Associates. The organization has opened offices at 19 Rector St., New York, will specialize in design of chemical process plants and equipment on a fee basis.

Associated with Dr. Knowles in the new venture are O. R. Kuster, who has resigned as chief engineer of General American's Process Division and will handle general chemical and metallurgical plant design, and R. C. Ried, formerly with the Valley Forge Cement Co. and Separation Process Co., who will be in charge of cement mill, coal cleaning and related projects.



C. L. KNOWLES: On his own.

With this nucleus, Dr. Knowles plans to enlarge the organization as circumstances require. In addition to the above mentioned categories, the group is interested in design projects in the pulp and paper field and the fertilizer field, especially phosphate rock concentration and phosphoric acid.

## VEGETABLE COATING

The hog is justly famous for its ability to encase large quantities of vegetables and other foods, but research now promises to reverse the tables and encase the hog in films made from fruit and vegetable wastes.

For, according to the U. S. Department of Agriculture, scientists at the Bureau's Albany, Cal. laboratories have created a new pectinate material which can be used as a soluble protective coating for sausage and other meat and food products. Basic raw materials for the novel product are citrus peel or apple pomace.

Preparation of the coating composition is simple. Essentially, a two per cent dispersion of low-methoxyl pectin is made, adjusted to a suitable acidity, and a calcium salt is added to yield calcium pectinate. The pectinate is held in solution above 104°F. but it gels below that temperature.

In use, the sausage or other meat product is dipped into the pectinate solution for three seconds, removed, and dried in a current of warm air. Within half an hour the gel has formed a strong film coating.

If the coated product is boiled the film is destroyed; if fried or roasted the film may be consumed with the meat since it is tender and edible.

In the opinion of the USDA the pectinate may well find application as a meat-encasement, and, possibly, as a coating for perishable fruits.

# EMULSION PAINTS

## The "Mayonnaise Principle" Revolutionizes Coatings

by GEORGE M. SUTHEIM  
Chief Chemist, Atlantic Calsomine Co., Inc., Brooklyn, N. Y.

**ARE EMULSION PAINTS THE COATINGS of the future or are they merely second-rate substitutes for oil-based products? There are supporters of both views, but a rational analysis of the facts permits but one conclusion, establishes emulsions as unique newcomers of unusual promise.**

**I**T IS almost trite to explain what paint is. Yet, in order to appreciate the difference between emulsion paints and other types a few words about paint in general are indicated.

Paints, or as the technical man more appropriately calls them, surface coatings, are liquid substances which, when coated out in a thin layer, become solid or dry. The dried layer, called the paint film, gives the coated surface a clean and uniform appearance, will protect the surface against the action of corrosive agents, like rain, sunlight or chemicals. Moreover it will render the surface washable and, hence, easy to keep clean and sterile. Last but not least, certain light and color effects can be created with paint. In brief: paint protects and decorates.

### PRINCIPLES OF FORMULATION

All paints, different as they may be with respect to color, texture, odor, and general appearance, are made up according to the same basic principle. Always there is a film-forming portion, which may be a solid or a liquid; a solvent, which imparts the necessary fluid consistency, and pigments or dyes, which give color and opacity to the paint.

The film-forming substances plus the solvent are commonly called the vehicle. In comparing emulsion paints with other types of paints, it is the vehicle which is fundamentally different. Specifically, in the more familiar paints, like house paint, enamels or lacquers, the vehicle is a true or a colloidal solution; in emulsion paints the vehicle is an emulsion.

### IMPORTANT EMULSIFIERS

True and colloidal solutions are dispersions of one matter (solid or liquid)—the solute—in a dispersion medium—the solvent. Solute and solvent have some sort of natural affinity for one another (from which the technical term *lyophilic*, solvent loving, is derived). Emulsions, quite differently, are made up of two

groups of constituents—again the one dispersed in the other—which have no affinity whatever for each other. On the contrary, they are thoroughly antagonistic and can be persuaded to stay together only by force or by the use of clever tricks.

Taking, for instance, the vehicle in an ordinary wall flat, it is composed of drying oils, resins, and several other ingredients, dispersed in mineral spirits, turpentine, or similar solvents. The solute and the solvent are compatible and the resulting vehicle is a homogeneous and very stable product. This is not so with an emulsion vehicle for the same purpose. Again combinations of drying oils, resins, etc., are dispersed in a dispersion medium, but the latter in this case is water which, as everyone knows, is fundamentally incompatible with oils and alike materials. In order to keep them together in spite of their inherent aversion, an appeaser has to be introduced, an agent capable of overcoming the mutual hostility of the two groups. Such agents are the emulsifying agents or emulsifiers.

### HOW EMULSIONS ARE FORMED

It is not the purpose of the present article to go into the complicated details of the physical chemistry of the emulsion system. Only some of the more important properties of these peculiar systems will be mentioned here. As pointed out, emulsions are dispersions of two immiscible substances, usually liquids, one of them being dispersed in the other in the form of droplets. Examined through the microscope, these droplets are plainly visible, and characteristic of an inhomogeneous substance. The dispersed droplets are of relatively large size, much larger, at any rate, than the dispersed particles in colloidal or true solutions. As a consequence of the coarser inhomogeneity and the inherent antagonism of the two phases, oil and water, emulsions are less stable than colloidal or true solutions. The lack of homogeneity also



**Most important application of emulsion paints, at present, is as interior wall finishes.**

accounts for the opaque appearance of most emulsions, milk being the most familiar example.

From the above definition of emulsions, according to which one liquid is dispersed in another liquid, a highly interesting conclusion can be reached. Taking oil (O) and water (W) as representatives of two immiscible liquids, one may just as well disperse oil in water, whereupon an oil-in-water emulsion (O/W) is promoted, as water in oil, which yields a water-in-oil emulsion (W/O), the latter being in almost every respect the opposite of the former. An O/W emulsion, in which water is the carrier (or, more technically, the external phase) is a water system—hence it has all the characteristics of a water system and can be thinned with water. A W/O emulsion, conversely, with oil or oil-like substances as external phase, is an oil system which can be thinned with oil or oil-like solvents, such as mineral spirits, naphtha, turpentine, etc.

### THE MAIN TYPES

In surface coatings of emulsion bases there are, of course, also two types, quite different in properties and performance, corresponding to the two types of emulsions mentioned.

O/W emulsion paints, in which the

vehicle is an emulsion of the oil-in-water type are water systems containing an emulsified oil phase. It must be repeated here that oil, in this context, does not stand for oil as such alone, but for any combination of film-forming substances which are immiscible with water—for example oleoresinous varnishes (with or without solvents), alkyd resins, natural or synthetic rubbers, bitumens, waxes, solutions of nitrocellulose or chlorinated rubbers, and so forth.

In spite of the fact that O/W emulsion paint is a water system, it produces on drying a paint film which is much more similar to an oil paint film than to a water paint film. When this type of paint is coated out the external water phase evaporates first; then the emulsified droplets of the internal phase, which contain all the film-forming ingredients, flow together and form a continuous "oil" film. If properly formulated and manufactured this film is not much different from an ordinary oil paint film.

W/O emulsion paints, in which the vehicle is an emulsion of the water-in-oil type, are oil systems containing an emulsified aqueous phase. The internal phase here acts, more or less, as a volatile filler; it contributes little or nothing to the ultimate film, since, in this type of paint, the film-forming ingredients are in the external phase.

The advantages and disadvantages of these two types of emulsion paints and their practical use will be discussed later. There is, however, a third type of surface coating, closely related to emulsion paints, the so-called *emulsifiable paint*. This peculiar type of paint was developed during the war. It is not an emulsion in the proper sense of the word, but a paint (of oil paint characteristics) which emulsifies readily when water is added. This paint has the rather unique property that it may be thinned with either water or the usual paint thinners. Of course, the reduction with water is not "thinning" but "emulsifying."

Since emulsion paints usually contain some 30-50 per cent water, whereas emulsifiable paint has none, the latter is very economical from the viewpoint of packing and shipping space; also the absence of water makes it insensitive against sub-freezing temperatures. For these reasons, emulsifiable paint was made in large quantities during the war for camouflage purposes and shipped to all corners of the globe. Whether it will find some peacetime application remains to be seen.

#### ADVANTAGES AND SHORTCOMINGS

Hardly ever has anything aroused more controversy in the field of paint-making than the question: emulsion paints or not? The dispute has gone on for more than a decade and it is still far from settled. Only blind enthusiasts will claim that emulsion paints are ideal for every purpose and, conversely, those who turn them



Many new formulations are being studied to determine their worth as weather-resistant coatings.

down as "no good at all" are equally wrong. The truth, as usually, is somewhere in the middle. What are the facts? Let us examine the pros and cons.

(1) *Emulsion paints contain no, or very little solvents.* The sole purpose of introducing solvents into paint is to reduce its consistency. Paints without solvents would usually be too viscous to permit application by the commonly used methods (brushing, spraying, dipping, etc.). Therefore volatile thinners are added which evaporate when the paint dries. By emulsifying the film-forming ingredients in an aqueous phase any wanted consistency can be obtained without the use of solvents.

This is, decidedly, an advantage. Most solvents are flammable; all of them have strong and rather disagreeable odors, and a marked toxic action upon the skin and respiratory organs. Hence, by applying a solvent-free emulsion paint, the fire hazard of a paint job will be reduced, and the general working conditions improved.

The claim, on the other hand, that considerable savings can be achieved by using "water instead of solvents" cannot be upheld without restrictions. True enough, solvents cost money (though some of them are very cheap in this country) and water is free. Yet, one cannot simply take the solvent out of a formula and throw water in instead. Unfortunately things are not as simple as

that. In order to promote a usable emulsion, emulsifiers and several other ingredients must be employed, all of which cost money, sometimes even more than the solvent that may have been replaced. Consequently, this argument "pro emulsions," is rather weak.

(2) *Control of viscosity is rather easy in emulsions.* Many substances, when dissolved in their appropriate solvent, form solutions of very high viscosity. For example, rubber in toluene, or nitrocellulose in esters or ketones. It is, therefore, impossible to prepare solutions with high non-volatile content, which are still fluid enough to permit manipulation. The same substance, or concentrated solutions of it, can be emulsified in an aqueous phase. The resulting emulsion of the O/W type will show workable consistency at much higher non-volatile content.

The reason for this striking difference is found in the peculiar heterogeneous structure of the emulsion system. The viscosity of an emulsion is dependent upon the viscosity of the *external* phase, as well as some other factors, yet independent of the viscosity of the *internal* phase. Thus it is possible to produce emulsions of approximately the same viscosity regardless of whether a very thin liquid, such as benzene or kerosene, or a very viscous material, like an alkyd resin or rubber, is emulsified.

It is, consequently, quite easy to vary

#### Some of the More Important Synthetic Emulsifying Agents (\*)

Chemical Name	Type of Emulsion	Trade Name	Manufactured by
2-Amino-2-methyl-1-propanol.....	O/W	Same as chem. Name	Commercial Solvent Corp.
Cetyl dimethyl benzyl ammonium chloride.....	O/W	Triton K 60	Rohm & Haas Co.
Diethylamino ethyl-oleylamide acetate.....	O/W	Sapamine A	Ciba Co., Inc.
Diethylene glycol monolaurate.....	W/O	Glaurin	Glyco Products Co., Inc.
Diethylene imide oxide.....	O/W	Morpholine	Carbide & Carbon Chemical Co.
Diethyl sodium sulfosuccinate.....	O/W	Aerosol OT	Am. Cyanamid & Chemical Co.
Pentaerythritol monoleate	W/O	Pentamul 126	Heyden Chemical Corporation
Polyoxyalkylene derivative of sorbitan laurate.....	O/W	Tween 20	Atlas Powder Co.
Sodium lauryl sulfate.....	O/W	Duponol WA	E. I. duPont de Nemours & Co.
		also Orvus WA Soap	Procter & Gamble Co.
Sodium oleate.....	O/W	Dresinate	Various
Sodium resinate.....	O/W		Hercules Powder Co.
Sodium salt of the oleyl derivative of taurine.....	O/W	Arctic Syntax T	Colgate-Palmolive Peet Co.
		also Igepon T	General Dyestuff Corp.
Sorbitan mono laurate.....	W/O	Span 20	Atlas Powder Co.
Triethanolamine.....	O/W	Same as chem. Name	Carbide & Carbon Chemical Co.

\* For more detailed compilations see References 5, 43.

the viscosity of emulsions over a wide range. Straight emulsions, as a rule, are rather thin. If, however, high viscosity is wanted for some reason, the external phase of the emulsion can be bodied up without changing the over-all properties of the finished product to any appreciable extent. For O/W emulsions, for instance, this is done by incorporation of so-called hydrophilic bodying agents, such as the water-soluble cellulose esters (methyl cellulose, carboxymethyl cellulose) or the alkali salts of alginic acid (sodium or ammonium alginate).

#### VERSATILITY

(3) *Emulsions are versatile with respect to wetting different surfaces.* The properties of wetting, spreading and penetrating of oily or watery materials are very different for specific surfaces. The key to their action is the old axiom—like seeks like. Oil and oil-like substances are non-polar compounds and, accordingly, they have a great affinity for non-polar surfaces, such as rubber, plastics, oilcloth, linoleum, metal or glass. Water and aqueous systems, on the other hand, are polar compounds and, hence, they prefer polar substances, like paper, wood, stone, and many of the fabrics.

If the problem arises of applying an "oil" to a polar surface it will best be presented in the form of an O/W emulsion which, being a water system, will wet the polar surface with ease, whereas oil will be repelled. The opposite effect, of course, can be performed with an emulsion of the W/O type. Accordingly, the formulator of coatings considers emulsions a versatile tool for applying his material in the most suitable form.

(4) *In emulsions ingredients can be combined which otherwise are incompatible.* Nature uses this principle on a huge scale in one of our most important food stuffs: milk. Milk, as is well known, is an O/W emulsion of butter fat (oil phase) in an aqueous solution of salts, proteins and carbohydrates (water phase). In fact, one gulp of milk gives us a harmonious combination of nourishing materials of all groups; this could not be accomplished by any other means but emulsions, since some of the foodstuffs are mutually incompatible.

The same principle is employed in several technical products (e.g., adhesives, insecticidal sprays, emulsion polymerization batches). In the field of coatings, however, there are as yet very few applications. But here, too, are definite possibilities. Most of the film-forming ingredients in paints, inks and lacquers are of the "oil" type, i.e., incompatible with water. Yet, there are several groups of interesting substances, such as preservatives, poisons, catalysts, etc., which are of the "water" type. Only in the form of an emulsion will the two types stay together.

(5) *Emulsions are less stable than so-*

*lutions.* Here we have the favorite point of attack for the enemies of emulsions. No one can deny that emulsions, being heterogeneous systems composed of strongly antagonistic constituents, are less stable than solutions. But what of it? Glass breaks easier than steel or wood, but it has, nevertheless, a wide field of application because of its peculiar properties. Emulsions, also, break easier than solutions. If improperly formulated or manufactured, or exposed to undue hardship during transport and manipulation, the emulsion may cause trouble through premature decomposition. Yet, many millions of gallons of emulsions (such as emulsion paint) have been made, shipped and successfully used without breaking. Doesn't that prove in itself that good emulsions are stable enough for all practical purposes?

There is still another angle to this much disputed question of emulsion stability. In fact, the lower stability of the emulsion system turns in several respects to an advantage. Taking milk as an example, the operation of churning is only possible because the emulsion breaks with relative ease; it would be quite impossible to produce butter by mere beating of the milk, if milk had the stability of a fat solution in a hydrocarbon solvent.

Similarly the lower stability of emulsion paints compared with solution paints, has some advantages. Let us look at one example. The first stage of drying of solution paint is merely due to solvent evaporation. The speed of drying depends upon (1) the solvent's rate of evaporation, and (2) the so-called solvent retention. Many of the film-forming substances have the disagreeable property of stubbornly withholding the solvent; then the coating dries and hardens slowly,

even if the solvent has a low boiling point. In emulsion paints of the O/W type the situation is different. First some of the water evaporates and then the emulsified droplets coalesce, producing the continuous film. The deposition of the film from emulsions is a more abrupt event than the gradual evaporation of the solvents from solutions. The drying is sharp and the inconvenient phenomenon of slow solvent release does not occur. Everything else being equal, emulsion paint dries faster than solution paint. This is decidedly an advantage, for instance, in ordinary wall paint, since "two coats in one day" can be applied, or in textile printing where the fabric passes with considerable speed over sets of rollers.

(6) *Emulsions are sensitive to sub-freezing temperatures.* Since emulsions contain a large proportion of water which freezes at 32° F. (aqueous solutions somewhat lower) the aqueous phase will freeze when exposed to low temperatures for a prolonged period. This, of course, is unavoidable. On thawing the emulsion may show some damage; it may break or have non-uniform, gritty texture. No emulsion can be considered absolutely frost proof, though many emulsions withstand repeated cycles of freezing and thawing without showing any appreciable change. The finer the droplets are dispersed the less the emulsion is in danger to suffer from freezing. It will be always advisable to protect emulsions from prolonged exposure to sub-freezing temperatures.

#### MANUFACTURING PROBLEMS

(7) *Formulations and manufacture of emulsions is more complicated than that of solutions for similar purposes.* There is little doubt that emulsion formulas con-



One of the trickier steps in the manufacture of paints is precisely matching color to insure that each batch meets established color standards. Here a batch is sampled, preparatory to "shading."

tain several peculiar items which are not employed in solutions. It is indispensable to introduce emulsifying agents, frequently some bodying agents must be used and almost invariably the formulas contain some preservatives. Moreover it is true that the preparation of good emulsions requires equipment which would hardly be used to produce solutions of the same material. Whereas solutions can be made with relatively primitive mixing or agitating devices, the manufacture of emulsions has to be executed in superior machinery, such as high speed mixers, homogenizers or colloid mills.

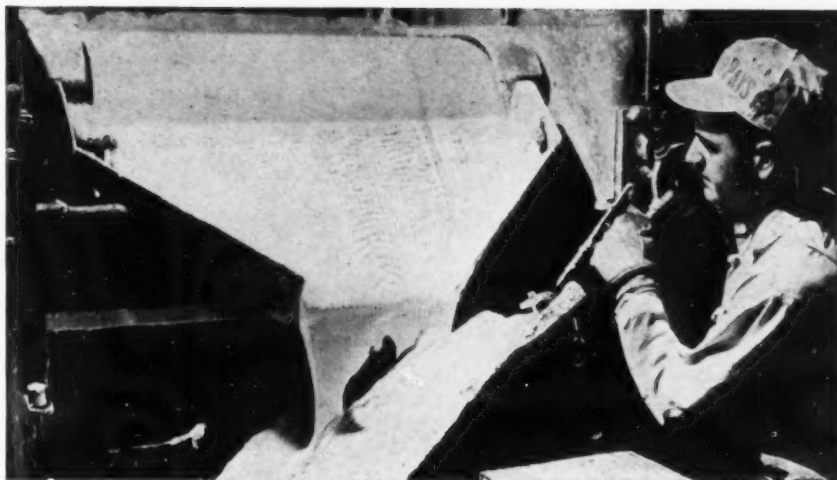
It may be added, however, that old practitioners in the field hardly regard this situation as a real disadvantage. Only newcomers in the realm of emulsions are bewildered, but after a short time the strange raw materials and the different types of equipment become as familiar to the man on the job as anything else he used before turning his attention to emulsions.

Taking the word emulsion paint in its widest sense, numerous coating materials might be mentioned which are not exactly paints. For instance, bituminous emulsions, used in huge quantities for construction work, to bind loose particles and to promote dust free and water proof surfaces on roads, roofs and floors. Though such preparations are applied to the surface, they do not fall under the definition of paint. In the following only some emulsion coatings will be discussed which are somewhat closer to the common use of the term paint, as a protective and/or decorative coating.

#### INTERIOR AND EXTERIOR PAINTS

The most important application of emulsion paint, at present, is the field of interior wall finishes. The quantity produced and used in this country is, according to a conservative estimate some 10-15,000,000 gallons per year, corresponding to a value of \$20-30 million. (Exact statistical data are not available since, according to a communication of the National Paint, Varnish & Lacquer Association, Washington, D. C., there is no segregated information on emulsion paint).

This type of paint, an emulsion of the O/W type, combines many of the advantages of the well known oil paints with those of the rather obsolete (casein or glue-bound) water paints. Similar to oil paint, emulsion paint yields wear-resistant, washable finishes of excellent light reflectance and uniformity; with water paint it has in common ease of application and absence of flammable and noxious solvents. As particular advantages the good sealing properties of emulsion paints may be mentioned, which permit their application on porous surfaces. Moreover, this type of paint, being an aqueous system of slightly alkaline reaction, can be coated on moist and moderately alkali-



Highly specialized equipment is required for the manufacture of coatings. In the preparation of emulsions such units as high speed mixers, homogenizers, or colloid mills, are essential.

line surfaces, where oil paints frequently fail.

The film-forming ingredients in interior emulsion paints were, until recently, mostly combinations of drying oils, like linseed, tung or dehydrated castor oil, with resins, such as ester gum or maleic resin. Alkyds of medium oil length were also used. When, after the end of the war, some of the new synthetic elastomers and plastomers became available, mostly as ready-made emulsions (synthetic latices), the interest of the formulator shifted to this new line of film-formers. Their usefulness as paint raw materials is now being carefully checked and the results reported so far are highly promising.

At present most of the interior wall paints of emulsion type are flat, but several concerns have recently made successful attempts to produce semi-gloss and gloss emulsion paints.

*Exterior.* The main difference between interior and exterior coatings is in the composition of the vehicle. *Interior finishes* (on solution or emulsion basis alike) are made up with short oil vehicles; exterior finishes, on the other hand, are formulated with long oil oleo-resinous varnishes or, the best at present, long oil alkyds. Here also the trend is to investigate the new synthetic polymerization products mentioned before.

#### TEXTILE COATINGS

Important quantities of emulsion finishes are used in the textile field. Much of it is prepared by the textile manufacturer himself and, thus, it is next to impossible to give reliable figures on the volume used. Yet, the quantity may be somewhere in the neighborhood of 2,000,000 gallons per year.

Finishes on textiles are applied for a variety of purposes. Reinforcing of the fabric, for instance, or imparting mildew resistance or flame-retardant and water-repellent properties; also the fabric is decorated by different coating methods, such as printing, dipping, and padding.

Taking the decoration of textiles by one of these methods as an example, pigments, i.e. finely dispersed colored particles, have to become solidly attached to the fabric's surface. Emulsions, either of the O/W or the W/O type, have proved eminently satisfactory for the purpose. Solution finishes (in organic solvents or in water) are also employed. But the skillful use of the advantages of emulsions, as enumerated earlier in this paper, makes it possible to obtain better or cheaper results, or even to produce effects that cannot be achieved with any other medium. Among the factors that count most: the ease with which any wanted consistency can be produced, sharpness of drying, reduction or elimination of fire and health hazards, versatile wetting, spreading and penetrating properties, and the fact that the equipment in the mill can be cleaned with water.

The film-forming ingredients in this field are at present undergoing intensive investigation. Up to now, predominantly, the typical varnish raw materials were used, such as urea-formaldehyde, melamine and alkyd resins and their combinations with drying oils. Currently, the new polymers and copolymers, like the polyvinylesters, polystyrene, neoprene, GR-S, etc., are coming to the fore.

#### FUTURE PROMISE

Emulsions, as we know them today, are not perfect for two reasons. Firstly, they are, as repeatedly stressed, heterogeneous systems. This is an innate property of the emulsion system, which causes a certain instability. There is nothing we can do about it, but to accept and understand the situation and to avoid conditions in which this imperfection may cause actual failures. In the second place, however, there are imperfections which can be corrected by improving the formulation and by using more efficient equipment. This is the task of the competent emulsion chemist. As the physical and chemical knowledge of these peculiar systems grows, considerably better emulsions will

(Turn to page 1063)

# OBSOLESCENCE Is Your Business

by CLYDE W. BALCH  
Maumee Development Co.  
Toledo, Ohio

**THE SELLER'S MARKET is waning; competition is returning. The pressure to produce more at any cost is giving way to the urge to cut production costs. One of the most stubborn forces that must be combatted in reducing costs is that of obsolescence induced by the technical advances.**

**E**VERYTHING BECOMES OBSOLETE, and in the chemical industry particularly, the rate of obsolescence is high. Processes and equipment rapidly decline in economic value relative to newer and more efficient alternatives available. The incessant pressure toward the production of better products at lower costs continually forces the replacement of equipment and the changing of processes.

The economic philosophy and business policy regarding the depreciation of assets and the replacement of machines are usually considered the province of accountants and corporate directors. This is unfortunate. It is the rapid advance in technology that antiquates methods and equipment. And, it is usually the young technical man—the chemist or chemical engineer—who it actually contributes to the advance of technology that is in the best position to see the possibilities for modernization.

Although the young technical man may be well versed in latest and most efficient machines and methods, he is often deliberately or inadvertently protected from any contact with the economic implications of his technology. This article is a plea for more training and emphasis on the economic aspects of technological developments for technical men.

## TWO FUNDAMENTALS

Such training would embrace two fundamental concepts: (1) The costs of operating proposed facilities or procedures *can* be predicted accurately from suitable theoretical calculations and experimental investigations. (2) The replacement of equipment or processes *is* justified economically when the saving in operating cost over some period of time equals or exceeds the cost of installing the new facilities.

Technically trained men generally take to the estimation of costs in a hurry. It is largely an extension of the scientific problem to a practical endpoint. About all that is needed is to show what the

elemental costs are, and the desired form for presenting figures in conformity with established company practice so that everyone else can readily grasp their significance.

Six items constitute the major cost factors in most chemical plants: raw materials, labor, maintenance, power, service facilities, and depreciation. Very often for convenience these are broken down further to make such other categories as operating supplies, packages, analytical work, etc. The cost elements obviously needed are the unit costs of the various raw materials, of steam, electricity, water, compressed air, etc. and of the various grades of labor employed.

As a means of showing how to estimate costs, the study of existing costs is excellent. Theoretically plant cost accounting shows present costs. However, the accounting of operating costs for normal control purposes is usually inadequate for the purposes of technical study. For one thing the efforts of a given laborer are often absorbed by several process steps, and the consumption of steam or electricity is known only for a group of machines. Practice at breaking down cost sheet figures into portions chargeable to each process step teaches the nature of processing costs and stimulates the imagination along lines of cost reduction.

The study of cases where costs have been reduced by new equipment or procedures also incites the imagination and adds to the general knowledge of how and where costs can be cut. As soon as a technical man grasps the general idea he will go ahead on his own, often finding many ingenious ways of uncovering costs and reducing them.

## MENTAL ROAD-BLOCKS

The estimation of operating costs is usually easy and readily grasped by technical men, but the next step—that of showing whether a change is justified economically—is a little more obtuse. While a man will follow the rules which

may say that a replacement is justified when the savings in cost equal or exceed the installation cost in two, or three, or four years, he often does so with misgivings.

The most common cause of doubts about replacement of existing equipment is the feeling that the company is taking a loss in discarding a perfectly good machine for a new one. This is particularly likely to be the case in a new plant when equipment only a year or two old is replaced because it is already obsolete.

Such misgivings probably stem from the idea that machines should be completely depreciated or amortized before they are discarded—an idea prevalent in some management circles. This notion that replacement of relatively new equipment means taking a loss leads to another situation: The only cost reduction proposals in which some people have any faith are those that pay for themselves in one or two years.

## ACCOUNTING ACROBATICS

Since many young technical men lack an adequate background in cost accounting a little general explanation of income statement and balance sheet manipulations



While the technical man is well versed in modern machines and methods, he is often unaware of the economic implications of his rapidly advancing technology.

is often helpful in surmounting these common road-blocks. It is the accounting terminology that causes much of the confusion. Depreciation usually means obsolescence; and, depreciation, as a cost item, does not mean that money was paid out. When it is understood that depreciation (obsolescence) reserves are set aside out of current earnings just to take care of technological antiquation of machines the fear of losing money on a discarded machine largely disappears. The relatively new machine that is replaced by one still better after only a short life of service is averaged out by the many other items which run economically long beyond their theoretical "depreciation" lives.

The explanation of why the "pay-out" period is what it is, or why the return on the investment must be such a per cent, is more difficult. Policies vary widely between companies and in different types of industries. Each firm must explain its own, because business judgment figures heavily in the determination of what is an acceptable ratio of cost savings to new investment.

The reasoning involved in the choice of the ratio is particularly interesting to the technical man because it should reflect judgment as to how rapidly technology is moving in his field. Many in the chemical industry have judged the proper "pay-out" period to be four or five years—i. e., a return on the investment of 25 or 20%. The rest of the explanation is a matter of income statement and balance sheet activi-



Pressure for better products at lower costs forces continual modernization of chemical plants.

ties. The rate at which "depreciation" is charged to cost must be sufficient to maintain the cash reserves required to finance the continual replacement of process and equipment.

Sometimes the technical man who has just had a little schooling in the economics of obsolescence is startled to hear that some other industry or company wouldn't consider any project unless it would pay out in a year or less. At first sight this appears to represent a terrific technological pace. Actually the short pay-out

is often used as an excuse for doing nothing, or very little, in the way of modernization.

#### DOUBLE REWARD

When the technical man becomes proficient in the evaluation of operating costs and in determining the obsolescence of equipment the benefits of the training accrue both to himself and to his company.

The company should find that the cost-conscious man turns out more and better work. When sound economic reasoning guides research and development work on new and improved processes there is less waste motion—less time lost in exploring economically dead-end streets. A firm's progress, both financially and technologically, should be more rapid when a major portion of its technical men have learned the practice of cost evaluations and obsolescence appraisal.

For the individual there should be less frustration from seeing his development efforts come to naught because they turn out to be uneconomical.

A number of large and progressive chemical firms have been training groups of technical men in the economy of replacement and obsolescence for quite a few years. Where the system is fully developed there are sizeable groups of technical men who continually examine and reexamine the possibilities of modernizing and improving plant equipment and processes by installing new and more efficient machines and methods for those that are constantly becoming obsolete.

But, even in the most progressive companies there is ample room for a broader extension of training technical men in obsolescence thinking. Ultimately all technical men should become more familiar with the economic implications of their scientific developments. Obsolescence is a technological thing.

#### REPLACEMENT OF MANUAL WAREHOUSING SYSTEM OF BAGGED CHEMICALS WITH A PALLET AND FORK TRUCK SYSTEM

	Investment	
	Present	Proposed
4 hand trucks.....	\$500	1 lift-truck complete with battery and charger.... \$ 5,700
50 skids.....	250	4165 pallets..... 15,650
Total.....	\$750	Total..... \$21,350

#### Profit or Savings Calculation, Annual Basis

	Present Costs	Proposed Costs
Operating Labor.....	\$15,000.....	\$ 3,750
Repair Labor.....	10.....	50
Mill Overhead.....	7,530.....	1,900
Repair Materials.....	20.....	210
Power.....	None.....	150
Depreciation.....	150.....	4,270

Total Present Costs.. \$22,710      Total Proposed Costs. \$10,330

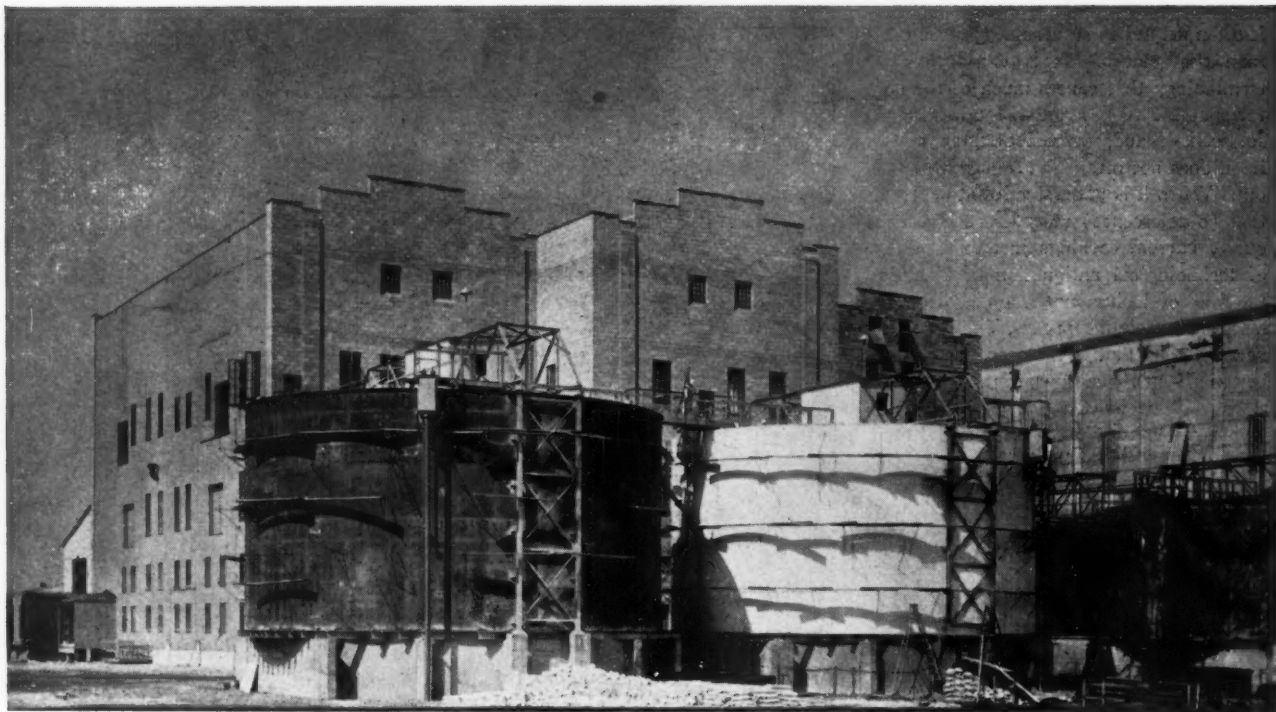
Total Present Cost..... \$22,710  
Total Proposed Cost..... 10,330

Gross Savings..... \$12,380  
Less General Overhead..... 620

Savings Before Taxes..... \$11,760  
Less Federal Income Tax..... 4,700

Net Profit Increase..... \$ 7,060

Return on Investment... \$ 7,060 × 100 = 34.7%  
\$21,350



New precipitated calcium carbonate plant of Wyandotte Chemicals Corporation at Wyandotte, Michigan. Carbonate settlers in foreground.

## PRECIPITATED CALCIUM CARBONATE

### Limestone Becomes a Fine Chemical

by ROBERT L. TAYLOR  
Editor, Chemical Industries

**IN ALMOST CINDERELLA-LIKE FASHION, once-humble calcium carbonate has emerged during the past decade as one of the major fine chemicals of commerce. But the transformation was the work of no fairy godmother. Perhaps it could be said that one did exist in the form of a ready market, but it took far more than the wave of a wand to produce the material required by that market at the price it was willing to pay. Here is how the job was done by one producer which has just completed its third carbonate plant in seven years.**

**T**HIS spring Wyandotte Chemicals Corp. put the finishing touches on a new \$2,000,000 plant at Wyandotte, Michigan, for the substantially increased production of high-purity precipitated calcium carbonate of limestone origin. This represents the latest step in a program which over the past ten years has not only pushed calcium carbonate into the ranks of the fine chemicals but has done it on a carload basis.

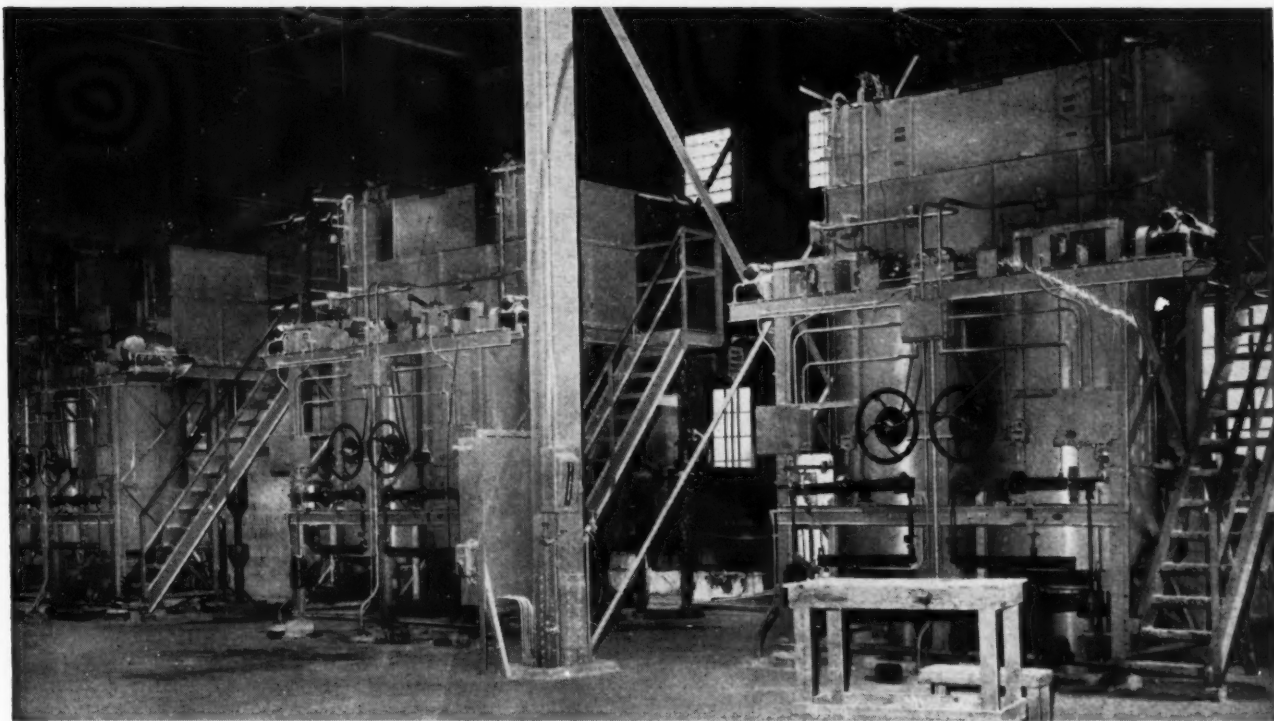
The new Wyandotte plant consists of two units for making paper-coating grade of carbonate and a third unit for making a grade of finer particle size for use as

a rubber reinforcing pigment. The paper-grade units are designed to permit switching over to a baking-powder grade as required, which involves still another particle size. All three products, it happens, meet the standards set up by the United States Pharmacopoeia.

To understand why a process that gives U. S. P. purity is being used to make a product which goes into paper making and rubber making, it is necessary to go back to the middle 'thirties when the whole program began. It was then that the paper companies themselves first started the ball rolling on calcium car-

bonate as a coating material. They were confronted at the time by two increasingly urgent problems: (1) the need for a printing surface that would absorb ink more quickly to accommodate higher press speeds, and (2) the mounting demand for a whiter sheet to permit better reproduction of natural-color photographs. And with the country still trying to climb out of the depression, the answers to these problems had to be such that they would not appreciably increase the cost of paper making.

It was this last requirement that was the toughest to meet, as standards involving dollars frequently are. It was apparent from the start, however, that the answer to all three problems was going to have to be a new economical coating to replace, or be used with, the natural clays that were then being used almost universally on white coated papers. Serving to speed the search was the opening up of patents, previously closely held, on high-speed paper-coating machines that fit on the end of the fourdrinier replacing the old roll and brush coaters.



Proportioning scales at start of process where sodium carbonate and calcium chloride solutions are weighed and proportioned automatically.

Clay coatings when applied by these machines at speeds of 1,000 feet per minute or faster exhibited certain thixotropic effects (a tendency to set up and not flow out smoothly after application) that made them hard to handle.

A number of possible coating pigments were considered that offered better whiteness and in some cases better ink absorbency than clay. Among them were blanc fixe (barium sulfate), titanium dioxide, lithopone, satin white, and calcium carbonate. The paper makers early became convinced that calcium carbonate offered the best possibilities for economic production in the form desired. In addition to what seemed to be an inherent suitability for paper-coating work, calcium carbonate when produced by precipitation permitted close control over such properties as particle size and other physical properties, all of major importance in determining the characteristics of a coating.

### THREE PROCESSES

Thus the initial market, at least, was pretty well cut out when Wyandotte decided to enter the precipitated calcium carbonate field in 1936. All that remained was to produce the quality of product desired in such a way as to be able to sell it at a price the paper makers could afford. The prospect looked attractive because the product dovetailed perfectly with other products then being made by Wyandotte—lime, soda ash, calcium chloride and carbon dioxide. In fact, because it was already producing all of these materials, it was in a position to consider all three of the possible methods of making precipitated calcium carbonate:

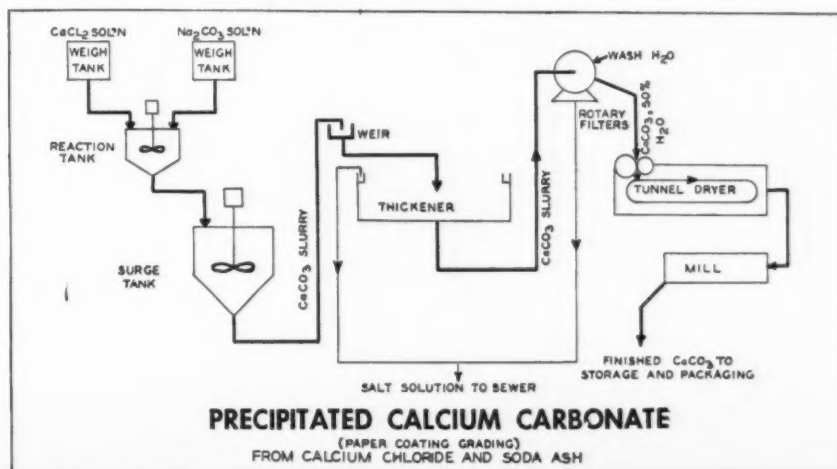
- (1) Causticization of lime slurry with soda ash  $\text{CaO} + \text{H}_2\text{O} + \text{Na}_2\text{CO}_3 \rightarrow \text{CaCO}_3 + 2\text{NaOH}$
- (2) Carbonation of milk of lime  $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
- (3) Metathesis of calcium chloride and soda ash  $\text{CaCl}_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{CaCO}_3 + 2\text{NaCl}$

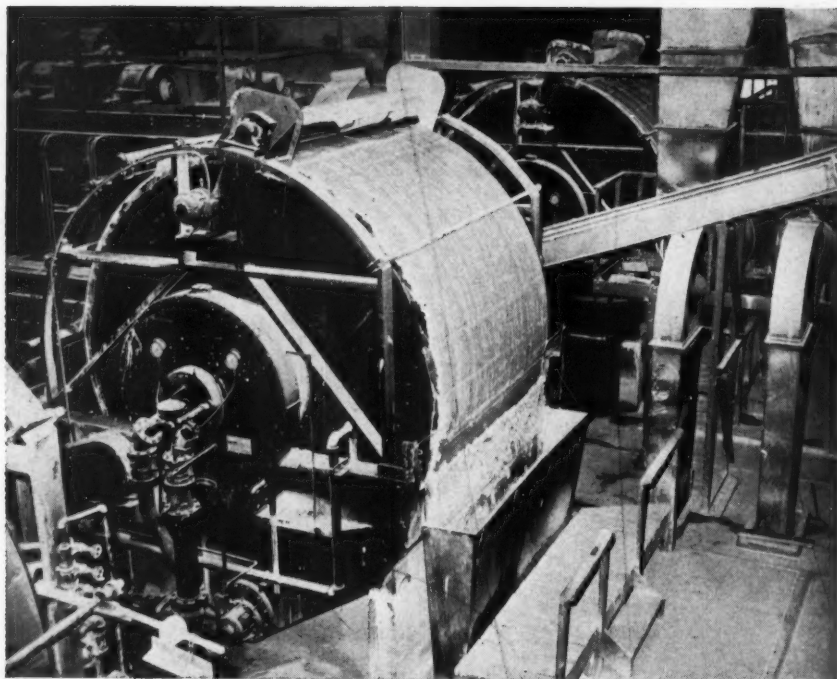
It was after considerable study and research that the third method was selected. One of the principal reasons was that it allowed the impurities in the crude limestone to be most readily eliminated. All limestones contain iron and manganese in quantities sufficient to make the direct production of a uniformly white material extremely difficult if not impossible. Also they contain organic matter which burns in the calcination operation and causes some further discoloration of the product. Still another hazard is silica, which is almost impossible to

remove completely in the first two processes, but if allowed to remain may form grit particles which mean excessive wear on printing plates.

Low alkalinity, a desirable property of paper-coating pigments, is also more easily obtainable with the third method since the calcium carbonate is precipitated in the presence of an excess of calcium chloride, an acid salt. The causticization and carbonation methods, in fact, require very thorough washing of the final product to eliminate all traces of caustic soda or calcium hydroxide, which if allowed to remain would raise the pH of the carbonate too far above the neutral point to make it a desirable coating pigment.

Wyandotte built a 5-ton per day pilot plant for the production of precipitated calcium carbonate from calcium chloride and soda ash in 1937. Its first real commercial plant was put up in 1940 and another in 1942. The newly finished plant





Calcium carbonate slurry from settlers is pumped to continuous filter wheels like this one.

roughly triples the company's previous capacity.\*

In the operation of all of these plants, the soda ash is obtained from the company's large ammonia-soda plant at the same location, while the calcium chloride is obtained from the ammonia recovery operation carried out in the same plant:  $2\text{NH}_4\text{Cl} + \text{CaO} \rightarrow \text{CaCl}_2 + 2\text{NH}_3 + \text{H}_2\text{O}$ . Thus, in effect, the making of soda ash, which starts with limestone and salt, is also a step in the chemical purification of calcium carbonate.

#### THE NEW PLANT

The new Wyandotte plant is housed in a three-story building constructed of concrete blocks and glass bricks. Dimensions of each floor are approximately 120 x 157 ft. Adjacent to the process building, with a carloading well in between, is a stock building of similar construction.

In the process building the two identical units for making paper-grade calcium carbonate are set up side by side. The unit for making rubber grade, in the same building, is complete in itself and similar to the other units with one or two exceptions which will be mentioned later.

Starting at the beginning of one of the paper-grade units, sodium carbonate and calcium chloride solutions come into separate automatic weigh tanks on the third floor of the building.

Rather than starting with finished soda ash, however, certain economies are obtained by taking an intermediate cut from

the ash plant which contains about 85% sodium carbonate and 15% sodium bicarbonate. This is used in the form of a water solution of about 20% concentration. (The bicarbonate reacts with calcium chloride to form calcium bicarbonate, which is unstable and decomposes to calcium carbonate, carbon dioxide and water.)

The calcium chloride solution is obtained from the ammonia recovery department of the ash plant and is run through outdoor Dorr settlers before it is sent to the calcium carbonate plant. This permits all of the inert materials which are carried over from the limestone to settle out. These include silicates, manganates, ferrates, aluminates and unburned limestone.

The weigh tanks drop accurately measured batches of the two solutions into a closed reaction tank equipped with a paddle stirrer. Roughly 111 lbs. of calcium chloride and 106 lbs. of sodium carbonate are required per 100 lbs. of calcium carbonate produced. The contents of this tank are in turn dropped into a large surge tank after the precipitation of the calcium carbonate is completed.

#### CONTROLS AUTOMATIC

Weighing and dropping are entirely automatic and are controlled by a battery of Microflex regulators, which are the nerve center of the whole process. One of the requirements of the paper-grade product is a proper gradient of particle sizes, and in fact different gradients are required for different coatings. By setting the controls at the weigh tanks, a series of batches can be made up so that each produces a given quantity of a precipitate of given particle size. Thus

when the batches are dropped one by one into the surge tank a final blend is obtained which has the particle size distribution desired. The cycle then automatically repeats itself. This wet blending method is more flexible and more easily controlled by automatic means than blending of dry sizes.

A feature of the control system is that setting of the precipitation controls also automatically sets the flow controls for the rest of the process, which is continuous from the surge tank on. Thus an operator can vary the particle size distribution of the final product at will, without having to worry about compensating adjustments in the rest of the process.

The control system is all the more remarkable when it is realized how many variables are involved in the precipitation reaction. Temperature, pH, proportion of reactants, rate of addition and other variables all have an important effect on the particle size of the precipitate.

From the surge tank the material is pumped continuously as a slurry over a weir to a Dorr settler. As the material in the surge tank is pumped to the settlers additional batches are made and blended with the material remaining in the surge tank. The slurry produced in the Dorr settler is pumped to an Oliver rotary vacuum filter on which the product is washed practically free of sodium and calcium chlorides and reduced to about 50% water in the case of the paper coating grade.

#### GRAVITY FLOW

From the filter the remaining flow is by gravity. The filter cake drops between a fin drum and roll which eject it as pellets onto the belt of a Proctor and Schwartz tunnel dryer. The temperature in the dryer is an important factor in preventing agglomeration. The dried pellets are put through a ball mill, and the final product is then carried by a Redler flight conveyor to the top of a vertical storage bin, from which it is drawn off at the bottom and packaged in 50 and 75 lb. paper bags or conveyed in bulk to paint-lined hopper cars. This represents the first time that coating grade calcium carbonate has been shipped in bulk carload lots. The paper grade material has an average particle size in the order of 1 micron, while the baking powder grade is in the 8 to 10 micron range. Because of its larger particle size this latter material shows little tendency to cake or agglomerate, so that final milling or grinding is not required.

The rubber carbonate, on the other hand, is an extremely fine material, particle size being in the range of 0.03-0.04 micron, and it is made in a separate process unit. Critical control of many variables is necessary at the reaction tank to get the very fine precipitate required. The steps of the process thereafter are similar to those for the paper grade, ex-

\* There are at present four other producers of precipitated calcium carbonate—Columbia Chemical Division of Pittsburgh Plate Glass Co., Diamond Alkali Co., New England Lime Co., and West Virginia Pulp and Paper Co.

cept that instead of a settler a second rotary vacuum filter is used in series with the first. Also, a hammer mill is used at the finish of the process instead of a ball mill.

Care is taken throughout the entire plant to prevent contamination that might jeopardize the rigid color standards observed for the paper grade product and the purity required in the baking powder grade. None of the products is permitted to come in contact with iron at any point in the processes. All equipment is stainless steel, bronze, or specially lined.

In addition to numerous control tests made at frequent intervals, composite samples of each day's production are taken for check testing of physical properties and purity. In the case of the paper coating grade an actual test coating is made up and applied to samples of paper to check such things as adhesive demand, viscosity, opacity, brightness, freedom from abrasive particles, ink penetration, and compatibility with other pigments and coating ingredients. The daily composite sample of the rubber grade is likewise evaluated by means of a regular rubber test.

#### EXPANDING HORIZONS

Calcium carbonate is now generally accepted by paper makers. There was a time when, while acknowledging its good brightness and absorbency, they considered it expensive to use because it required considerably more adhesive (starch or casein) in the coating mix as compared with natural clays. This objection was overcome, however, by developing a technique for mixing at higher densities, which has brought the adhesive requirement down to where it is now close to that of clay. General adoption of this technique was hastened by the trend toward applying coatings at higher consistencies to increase speed and reduce drying time.

Briefly, the high-density technique consists of kneading slurries of carbonate ranging from 70 to 75 per cent solids, as against solids contents as low as 40 or 50 per cent when the older low-density method is employed. The kneading is carried out in the presence of all or a substantial part of the required amount of adhesive and is continued for about 45 minutes. While various types of equipment may be used for the purpose, a dough mixer has been found to be most suitable. Using this method, less than 8 per cent casein is sufficient to yield a Dennison wax test of 5 in contrast to 25 per cent casein when the low-density method is used. Basically the problem is one of breaking down agglomerated particles. These absorb abnormal amounts of adhesive by a capillary principle and thus prevent it from acting to its fullest extent as a bonding agent.

Adhesive demand reductions of a similar magnitude may also be obtained by ball milling slurries dispersed with one

to three per cent casein prior to adding the remaining required casein and water in preparing the finished coating color.

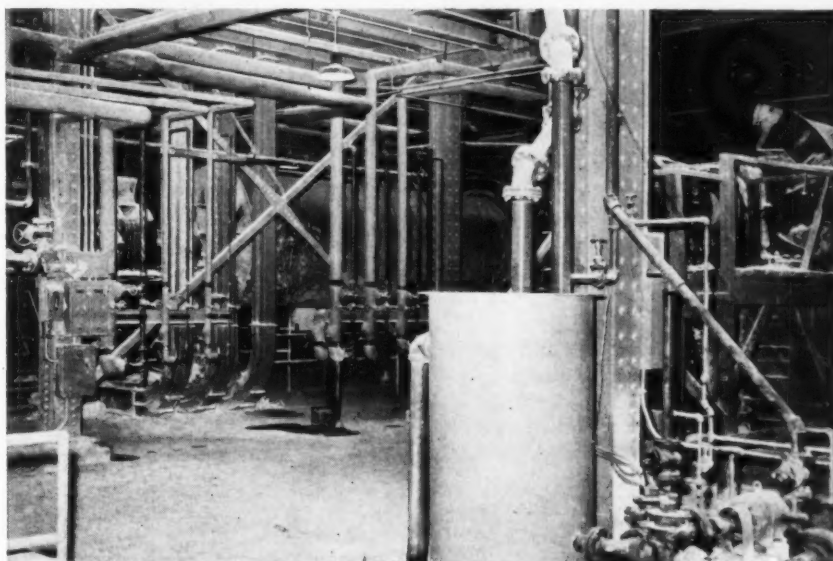
In addition to paper coatings, paper grade calcium carbonate is now being used as a titanium dioxide extender in paints, a reinforcing agent in some types of rubber and plastics, a pigment and extender in printing inks, a neutralizer in fermentation reactions, and an antacid in pharmaceutical products.

The baking powder grade got its start during the war when it was adopted by a baking powder manufacturer as a substitute for scarce corn-starch. After becoming sold on its calcium-enrichment and vitamin-retention properties the company continued its use and others joined the ranks.

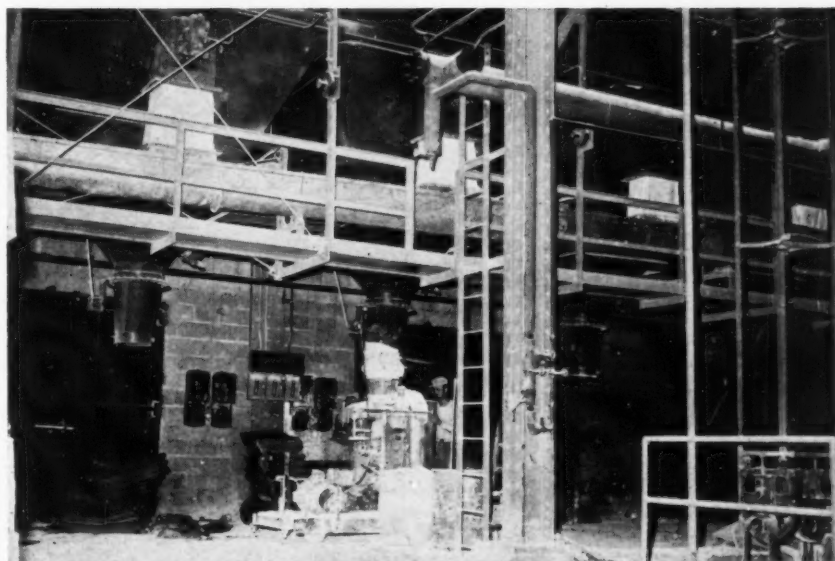
Only one rubber grade is being produced by Wyandotte at present. It is used as a reinforcing pigment in colored products such as drug sundries and in wire coatings and inner tubes, where it

imparts high elongation, tensile strength and tear resistance, and low modulus. Considerable experimental work has been done which indicates that additional properties such as high modulus may also be obtainable through possible variations in the process. The rubber grade is further finding application in printing inks where magnesium carbonate has been used and in paints for bodying purposes and to give color uniformity. In wrinkle finishes it helps produce uniform patterns.

Precipitated calcium carbonate has come a long way in the last ten years. With time and further research we may well expect to hear of further accomplishments by this rejuvenated member of an old chemical family. The Wyandotte research department is even now managing to find time in a crowded program to sandwich in work on calcium carbonate for a number of other fields of application hitherto limited because of purity restrictions.



Dry carbonate is conveyed to ball mills where it is milled back to original particle size.



Bulk loading conveyor carries Wyandotte precipitated calcium carbonate to steel hopper cars.

# Goodrich Chemical Centralizes SEMI-WORKS DEVELOPMENT

by FRANK K. SCHOENFELD, Technical Vice-President  
B. F. Goodrich Chemical Co., Cleveland, Ohio

**UNDERLYING B. F. GOODRICH CHEMICAL COMPANY'S new general experimental plant at Avon Lake, Ohio, are the convictions that (1) there are too many gaps in extrapolating pilot-plant data to actual production and (2) a pilot plant does not produce enough material for sales promotion.**

**W**HEN a commercial-size plant was put into operation in 1940 by B. F. Goodrich Chemical Co. at Niagara Falls, N. Y., to employ a newly developed process, the first batch of product was exactly what had been specified. More important, the plant has operated efficiently from its start.

Behind the experience at Niagara Falls was a solid background of experimental data which enabled Goodrich to steer a straight course, with no time-consuming and profit-eating detours for process changes. This and similar good results with other problems led to the establishment of the experimental station at Avon Lake, a suburb of Cleveland, whose facilities are integrated to implement the company policy of carrying out semi-works studies for all future new products.

Before describing the activities at Avon Lake it is desirable to trace the path of an idea at Goodrich from its inception to its substantiation in a commercial product ready for sale. The idea is usually conceived—or, at least, brought forth—in The B. F. Goodrich Company (of which the chemical company is a division) research laboratory at Brecksville, Ohio. If the chemical company accepts it for study, it is sent to Avon Lake for manufacturing development; sales promotion and an application survey are undertaken concurrently by other departments.

Acceptance of the process for commercial exploitation is followed by translation of experimental data into a design for a full-scale plant, construction and operation of the plant, and provision for handling sales, service and control problems.

## HOW AVON FITS IN

B. F. Goodrich Chemical Co. looks to the central research laboratories of The B. F. Goodrich Co. for its fundamental research on materials and processes. These laboratories have a pilot plant

unit, but, in accordance with the customary pattern, it serves only to determine the basic process required and to make enough of the product to give a rough idea of production cost and quality. Its primary function is to develop fundamental new chemical engineering techniques; its secondary function, to supply the research chemists with intermediates.

When this central research organization gives the chemical company a new material or a new process in the fields of organic chemicals or vinyl resins, it goes to the Avon Lake station, whose responsibility it is thoroughly to investigate the new product or process and perfect these phases of the problem:

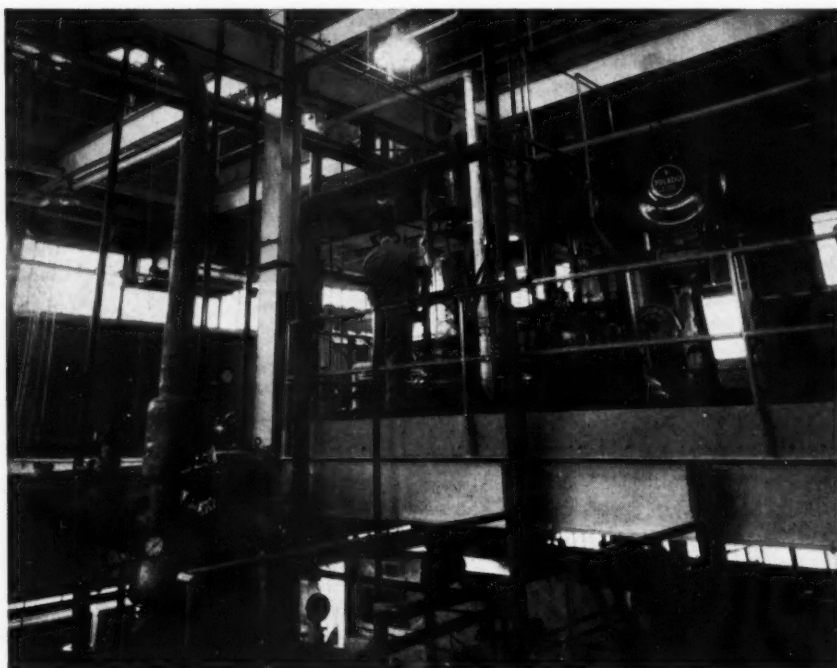
- a) Synthesis procedure
- b) Standardization of quality

- c) Obtaining required operating information
- d) Selection and development of suitable mechanical devices
- e) Development of production plant design
- f) Production of sufficient material for market evaluation

Implicit in these responsibilities are the contentions (1) that there are too many gaps in the extrapolation of pilot plant data to actual production and (2) that a pilot plant cannot produce enough material for sales promotion while a plant is being planned and built.

The process when it reaches Avon first goes into the "micro-engineering" set-up. Although the equipment here is usually of glass and of laboratory size, it is used for engineering rather than research studies. If the process is exothermic, for example, the heat of reaction and the maximum allowable temperature are determined; the engineers then calculate how large a batch can be made, the heat from which can be dissipated at a rate sufficient to keep the maximum temperature from being exceeded. Distillation characteristics, to take another example, can often be worked out so precisely that the proper plant still can be specified. Specific heat, viscosity, reaction rate and other physical data pertinent to process design are also determined at this stage, as are process variables such as agitation, catalysis, methods of purification, optimum temperature and temperature tolerance. Each step, in short, is evaluated as accurately as possible.

The process is then submitted to the design group, which constructs a flow sheet for semi-works. This group determines, too, what equipment is on hand



Glass-lined and stainless steel semi-works equipment of 100 to 300 gallons capacity.

and what must be purchased or made. At the same time chemical phases of the process are explored in order to give answers to such questions as, What product quality is possible? What purity, moisture content, etc., is permissible? What hardness (of a resin) is desired? The answers provide specifications for the product.

### THE SEMI-WORKS

Next step in process development is the semi-works. This is an extremely flexible unit utilizing versatile production-size equipment which can be converted rapidly from one process to another. Complete versatility is, of course, impossible. But it is an ideal which is aimed at.

Size of the semi-works equipment is important: When a process is stepped up from the laboratory pilot plant to small-scale production, difficulties may be encountered or refinements conceived, the gravity or value of which can be realized only under commercial operating conditions. But the same conditions apply in semi-works, and the process can be modified there until it works dependably and satisfactorily. Accordingly, when a process is finally operating smoothly in the semi-works, enough is known about it to ensure faultless construction of a large plant.

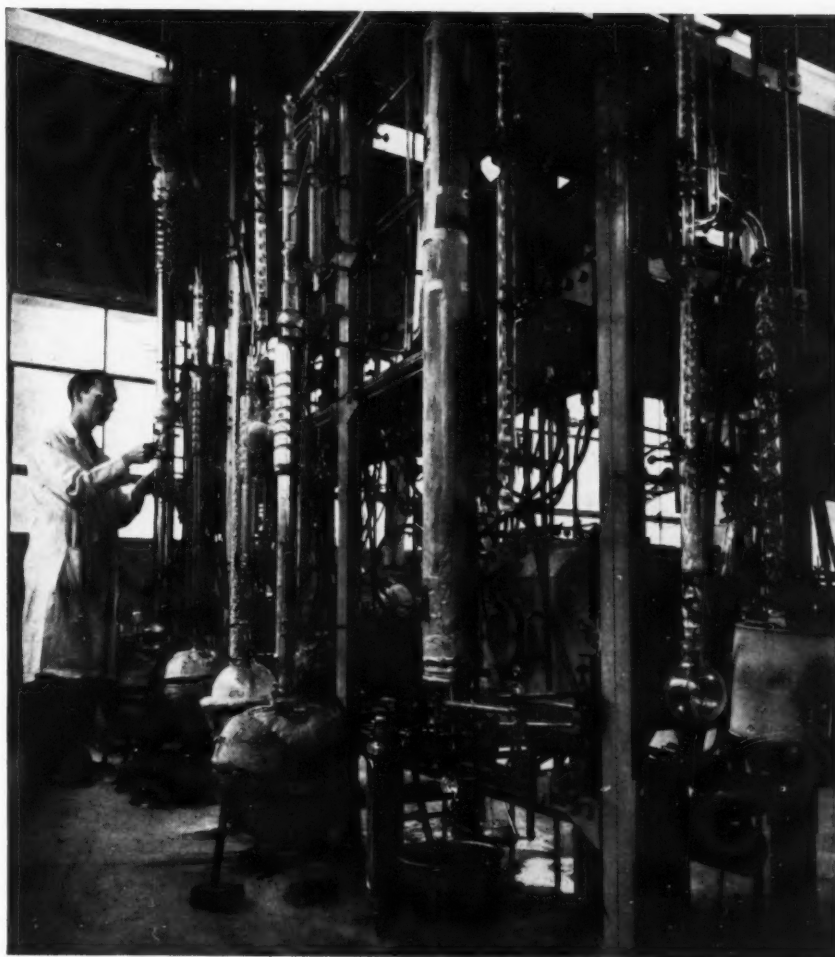
Here, too, such problems as by-product utilization and waste disposal are faced and solved. One process, for example, was carried out in water solution and employed an excess of one reagent. It was learned that recovery of excess reagent under those conditions was more expensive than the raw material was worth. Reaction conditions were consequently changed to circumvent the use of water, so that the excess material could be vaporized out of the reaction medium and directly recovered.

The semi-works also produces enough material so that its exact cost and purity in production quantities is well known. Also important, there is enough product for introductory sales and maintenance of sales until a full-scale plant is operating.

### VERSATILE EQUIPMENT

More reliable data for selection of full-scale equipment is another advantage which accrues from the semi-works. This includes production testing of commercially available equipment as well as the development and evaluation of special equipment when it is needed. Sooner or later reactors, piping, motors, agitators, transfer vessels—all must be tested under operating conditions. Use of such full-size equipment in the semi-works makes such testing an integral part of the operations.

The semi-works at Avon Lake is divided into two sections: one for plastics and elastomers and one for chemicals.



Micro-engineering (5 to 12 liter) equipment, where preliminary process data is gathered.

The resins portion has equipment from 25 lbs. to 2000 gal. capacity. The smaller units are used for product, rather than process, development. Many resins are prepared by fairly standardized procedures, differing only in proportions and kinds of ingredients. In those cases only small quantities are needed for evaluation, and the process itself is fairly conventional. The larger equipment is so arranged that as many process variables as possible can be studied. The kettles, for example, can be equipped with different styles of agitators, and the speed of agitation can be varied at will.

In the chemicals portion is glass-lined and stainless steel equipment of 50 gal., 100 gal. and 300 gal. sizes. Value of the raw materials largely determines which size is to be used in the preliminary runs. If an expensive product doesn't turn out too well in one or two semi-works runs, the process is often sent back to micro-engineering to conserve material.

The 300-gal. kettles are equipped, like the resin kettles, for different types of agitation at variable speed.

Another example of versatility is a portable refrigeration unit which can be moved to various reactors in turn. This, combined with steam ranging up to 150 psi, gives a reaction temperature range of  $-20^{\circ}$  to  $180^{\circ}$  C. There is also a tray

drier of variable air intake and temperature range up to  $150^{\circ}$  C. Filter presses and crocks, too, are on wheels so that they can be moved about to form integral parts of various reaction set-ups.

### PERSONNEL

All supervisory personnel at Avon Lake are trained chemists and chemical engineers picked especially for their ability as production technicians. They are concerned with development, but their production experience enables them to project their knowledge into the operating field. In order to obtain and hold operators who are familiar with development operations and mechanics who are specially trained for semi-works servicing, these jobs—on an hourly basis in most firms—are salaried positions.

Avon Lake is new. It was built last year and has been in operation for only a few months; consequently, it has earned no service stripes as yet. But the Goodrich management believes there is a definite place in its operations for a separated unit containing production-size equipment and staffed with production-wise personnel, that such a unit will promote most economical and effective development of new products. The Avon Lake Experimental Station is the embodiment of this belief.

# Commercial GLYOXAL Clears New Research Paths

by J. A. FIELD, Product Manager, Fine Chemicals Division  
Carbide & Carbon Chemicals Corporation  
New York, N. Y.

**LARGE-SCALE PRODUCTION OF GLYOXAL at 17 cents a pound has coaxed this interesting dialdehyde from the laboratory shelf into industry. Already being used for shrinkproofing rayon, glyoxal is interesting for hardening casein and glue, wet-strengthening and greaseproofing paper, new synthetic fibers, and as a versatile intermediate in organic synthesis.**

**G**LYOXAL, a new building block for the chemical industry, is now in production on a commercial scale. For 90 years it had remained on laboratory shelves awaiting a process for its commercial production. Although originally discovered by H. Debus in 1856<sup>1</sup>, it has generally been produced by the oxidation of ethanol and acetaldehyde, but the commercial process developed by Carbide and Carbon Chemicals Corporation<sup>7</sup> carries out the vapor phase oxidation of ethylene glycol. Pilot-plant quantities were first offered to industry in 1942 to supply small quantities for an anti-pellagra vitamin<sup>4</sup> and large-scale production began on September 16, 1946, to satisfy the demand for the "Sanforset" process of shrinkproofing spun rayon developed by Cluett, Peabody and Company, Inc.<sup>8</sup>. As a result of the operation of these facilities, glyoxal is now marketed as a 30 per cent aqueous solution at a price of 17 cents per pound in tank car lots.\*

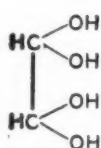
Glyoxal is highly reactive and is considered useful for most of the applications for formaldehyde, especially those dealing with the insolubilization of polyhydroxyl compounds and proteins such as casein and animal glues. In many cases its relative non-volatility and mild odor permit safer and more pleasant operating conditions than can be obtained when the more volatile formaldehyde is used. As the vapor pressure of the glyoxal hydrate from aqueous solution is less than 1 mm. at 100° C., glyoxal is of particular interest in chemical processes where this low volatility assures freedom from unpleasant vapors.

## AVAILABILITY

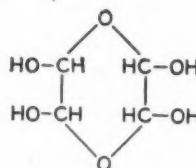
The commercial material is a stable, light-yellow aqueous solution containing a minimum of 30 per cent by weight of

glyoxal. This commercial solution also contains small amounts of ethylene glycol, glycolic acid, formic acid, and formaldehyde, and may be compared to formalin, the 37 per cent solution of formaldehyde in water. Glyoxal 30 per cent is quite stable and no extraordinary precautions need be taken during storage other than using glass, resin-lined, or stainless steel containers to prevent corrosion by the water present.

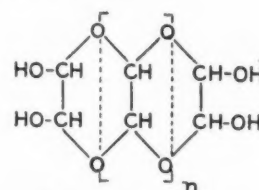
Pure glyoxal is a yellow liquid with an acrid, irritating odor and polymerizes readily to a resinous white solid. It is believed that glyoxal exists in its water solution as a mixture of a series of hydrated forms to which the structural formulas shown below could be assigned:



Tetrahydroxyethane



Tetrahydroxydioxane



Polyglyoxal

Hydrated Molecular Structures of Glyoxal in 30% Solution.

These forms of hydrated glyoxal appear to be in equilibrium with one another and in most cases undergo the reactions typical of the non-hydrated aldehyde or monomer. The size of the integer  $n$  varies with the concentration of glyoxal in the solution and it appears that at a concentration of about one per cent by weight, the tetrahydroxyethane form predominates, while at the 30 per cent commercial concentration, the integer  $n$  is believed to be between 3 and 4.

The bisulphite addition product is a white crystalline solid containing approximately 20 per cent by weight of glyoxal. Its chemical formula is:  $\text{HO}-\text{C}-\text{OSO}_2\text{Na}$



Glyoxal sodium bisulfite can be prepared



Rayon, dimensionally stabilized by glyoxal, emerges from oven in "Sanforset" process.

easily by treating glyoxal 30 per cent with an aqueous solution of sodium bisulfite. Because most of the organic impurities are absent, this form is preferred by those interested in a source of pure glyoxal that is convenient and easy to handle. At the present time, no other practical means of supplying glyoxal in the pure state has been found commercially feasible.

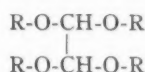
## CHEMICAL PROPERTIES

Glyoxal undergoes most of the reactions of formaldehyde but also takes part in several unique reactions not comparable to the simpler aldehydes. It is easily oxidized, the principal product being formic acid except under carefully controlled conditions when it may be converted to glyoxylic acid. When mixed with dilute alkali, glyoxal undergoes an internal Cannizzaro-type reaction to form salts of glycolic acid. It reduces mildly alkaline solutions of silver salts to the metal and copper salts to the oxide.

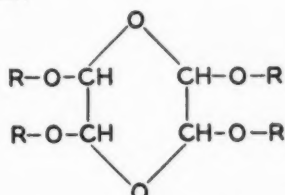
The most important applications for glyoxal at the present time depend upon

\* Effective September 16, 1946. F.O.B. South Charleston, W. Va.

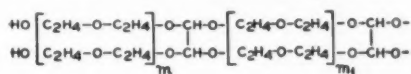
its ability to form acetals with organic compounds containing hydroxyl groups. The general formula for the simple acetals formed by reaction of glyoxals with alcohols is as follows:



where the alkyl groups (R) in these compounds can theoretically be any group or combination of groups. A second type of acetal is formed by the reaction of four hydroxyl groups with two molecules of glyoxal to yield compounds of the general formula:

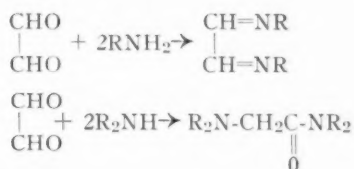


Tetraethoxydioxane and tetraisopropoxydioxane are representative of these glyoxal derivatives<sup>9</sup>. With glycols, such as ethylene glycol, naphthodioxanes can be prepared<sup>10</sup>. Typical of the possibilities of this type of reaction are naphthodioxane itself and dibutoxydioxane which is prepared with ethylene glycol, butanol, and glyoxal (see Fig. 3). When the polyglycols are caused to react with glyoxal, high-boiling, viscous products are obtained which are thought to be linear poly-acetals of a nature represented by the structure:



The simple acetals of glyoxal exhibit normal acetal behavior and are stable in neutral or alkaline media but are hydrolyzed in the presence of acids. Certain of the acetals, such as the tetramethyl acetal and tetramethyl "Cellosolve" acetal, are both water soluble and oil soluble and their use as coupling agents for various immiscible liquid systems appears possible. Because they can be hydrolyzed in a controlled fashion under certain conditions, they can be used as a source of glyoxal where it may seem desirable to generate this material slowly during a reaction.

Glyoxal reacts readily with ammonia and amines, the reaction varying somewhat with the type of amine. Thus with primary amines, the expected derivatives are obtained, while with secondary amines, the amide of the aminoacetic acids are formed:



With triethanolamine, a practically quantitative reaction to triethanolammonium glycolate is obtained. Of particular interest among the reactions of glyoxal with

amines is the formation of glyoxalines or imidazoles with yields up to 70 per cent:



The glyoxalines are high-boiling liquids or solids and their physiological action may be of interest.

By slight modifications of these same reactions, resins of high molecular weight are produced from urea, cresols, and phenols. In this respect, glyoxal is similar to formaldehyde in the formation of long-chain polymeric condensation resins, and the presence of its two aldehyde groups increases crosslinking.

## PHARMACEUTICAL DERIVATIVES

One of the first commercial demands for glyoxal was for the synthesis of the anti-pellagra vitamin called pyrazine-2,3-dicarboxylic acid, which is structurally related to nicotinic acid (see Fig. 3). These acids are much alike in that they have a carboxyl group which is beta to a tertiary nitrogen. A relationship between chemical structure and vitamin action has been observed in several compounds of which nicotinic acid is the prototype. When the carboxyl group is in the beta position, anti-pellagic action is exhibited and these acids are used in the treatment of pellagra and "black tongue" diseases.<sup>4</sup> In contrast to nicotinic acid, the pyrazine compound does not produce dilation of the blood vessels which often follows large doses of nicotinic acid. Within from 2 to 12 hours after administration of the pyrazine carboxylic acid, pellagra victims report a great increase in the sense of well-being and relief from tongue inflammation. The synthesis of sulfapyrazine from pyrazine-2,3-dicarboxylic acid has been worked out through the formation of aminopyrazine.

Certain other products in the pharmaceutical field which may be synthesized from glyoxal are allantoin, hydantoin, acetylene monoureine, and acetylene diureine (see Fig. 3). Each of these compounds can be made by reacting glyoxal with urea under specific conditions. Allantoin, also known as glyoxal diureid or cordianine, is an alkaloid which influences diuresis, muscle action, and the central nervous system. It possesses the property of accelerating cell "rebuilding" in the body and is administered to produce the healing of gastric ulcers and non-healing wounds. Hydantoin and substituted hydantoins are also of interest in pharmaceuticals. Diphenyl hydantoin, for example, is used as an anti-spasmodic in the treatment of delirium tremens.

## DYESTUFF DERIVATIVES

Glyoxal contains the simplest chromophore group which makes possible the manufacture of insoluble dyestuffs by reaction with aromatic diamines, aminophenols, hydrazines, and other amino and

aminohydroxyl compounds. For instance, the dye intermediate quinoxaline (see Fig.

3) is formed by reacting glyoxal with *o*-phenylenediamine. Indigo and substituted indigos can be synthesized from glyoxal sodium bisulfite and suitable aromatic amines. Early patents<sup>2</sup> covered the synthesis of anthraquinone vat dyes and thiazole dyestuffs. Glyoxal can be considered for use in reducing vat and indigo dyes to their water-soluble leuco bases and as a reducing agent for stripping dyestuffs from fabrics in a manner analogous to the action of formaldehyde in the sulfoxylates.

## SHRINKPROOFING RAYON

The largest present industrial demand for glyoxal is for the "Sanforset" treatment of spun rayon to "shrinkproof," or dimensionally stabilize, fabrics. This was announced by Cluett, Peabody and Company, Inc., on March 28, 1947. By controlling the normal tendency of such fabrics to shrink when laundered, glyoxal opens up a greatly expanded future for the rayon industry.<sup>8</sup> The glyoxal stabilization treatment produces an effect which is permanent to repeated washings and the hand and texture of the fabric are not altered. It is an interesting fact that after treatment, viscose or cuprammonium rayon fibers are no longer soluble in cuprammonium solution and will not form cellulose xanthate. The tendency of the fabric to swell when wet is greatly reduced. These fundamental changes in the chemical nature of rayon would seem to indicate that a new type of fiber is actually produced by the reaction between



Rayon slips launder and iron without shrinking.



Untreated viscose rayon shirt collar (bottom) shows much more wear and shrinkage after 40 launderings than its glyoxal-treated mate (top) subjected to the same grueling test.

the glyoxal and the cellulose in the rayon.

One of the chief advantages of the glyoxal treatment is that there is no resin coating formed on the surface of the fibers. The treatment is applied without producing any stiffening or harshening effect on the fabric, and any unreacted glyoxal on the surface is removed after curing by a soap wash. Hydrolysis does not take place under storage conditions nor during washing operations, and no offensive odors develop in the treated fabric. The stabilized rayons show no chlorine retention properties, so that white and pastel shades are safely treated. In many cases with vat dyes, an improvement in light and wash fastness is indicated. This process causes little or no change in shade on vat colors, but the proper selection of suitable direct colors is necessary.

Glyoxal stabilization can be combined, under the proper conditions, with other finishes such as water-repellent treat-

ments which require much the same mechanical handling, including a curing operation. When desired, a firm or even a crisp hand can also be produced by adding the proper stiffening agent to the treating solution.

#### OTHER TEXTILE APPLICATIONS

Comparable uses on other textile fabrics include the application of glyoxal to cotton twill fabrics for increased wear resistance and to rayon pile fabrics for improving resistance to crushing or creasing. Glyoxal also reacts with polyethyleneamines to yield products which are static eliminators in synthetic fibers and hosiery operations.

The possibility of extruding polyvinyl alcohol filaments through a glyoxal bath to yield a new synthetic fiber needs some attention. Incidentally, the same can be said of casein for a "Lanital" type fiber. Formaldehyde is being used at present in this application, but in view of its

health hazards and the process difficulties encountered, real possibilities for glyoxal exist in this field.

#### HARDENING CASEIN AND GLUE

Advantage is taken of the reactivity of the two functional groups in glyoxal for "insolubilizing" reactions whereby protein materials and compounds containing multiple hydroxyl groups are rendered water insoluble.<sup>3</sup> A low concentration of glyoxal serves as a convenient modifying agent for hardening and increasing the water resistance of gelatin, animal glues, albumen, casein, zein, and other proteins. To prevent loss of glyoxal by conversion to glycolic acid, alkaline conditions should be avoided, and it appears that such reactions may be most effectively carried out at or near the isoelectric point of the particular protein concerned. Glyoxal also reacts with polyhydroxyl compounds such as polyvinyl alcohol, partially hydrolyzed polyvinyl acetate or acetal, and water-soluble hydroxyethyl cellulose to increase their resistance to water. Here its two active functional groups impart a crosslinking tendency which is particularly advantageous. Glyoxal insolubilizes certain materials that are not affected by formaldehyde: for example, glyoxal reacts with tetrathylene glycol to form a soft, water-insoluble resin; formaldehyde does not react.

#### IMPROVES CASEIN SIZES

A paper size is usually a coating consisting of clay, pigments, and a binder such as casein, starch or "Cellosize" hydroxyethyl cellulose. The binder forms a matrix to bind the materials together and to hold them on the surface of the paper. These binders are rendered water resistant when a small amount of glyoxal or formaldehyde is added to the coating mixture. The 30 per cent glyoxal solution is best applied in a quantity sufficient to give 5 to 10 per cent of contained glyoxal based on dry casein or 10 to 20 per cent based on dry starch. The actual ratio depends upon the degree of water resistance required in the treated paper. The glyoxal is added to the casein or starch mixture prior to spreading on the paper so that an even curing of the binder occurs on drying the paper. Mill operators have found that the absence of disagreeable odor and toxic vapors, the small effect on the viscosity of the casein dispersion, and the rapid and complete cure of glyoxal are definite advantages over the use of formaldehyde in paper coating.

#### INCREASING PAPER WET-STRENGTH

A most promising application for glyoxal in the paper industry is its reaction with cellulosic materials such as "Cellosize" hydroxyethyl cellulose in the making of paper toweling and cleansing or toilet tissue to increase wet strength.<sup>5</sup> Varying

Fig. 1—Water-Soluble "Cellosize" Hydroxyethyl Cellulose Films Modified with Glyoxal

Sample Number	Blank Untreated	1	2	3	4	5	6
Contained glyoxal, based on the dry film.....	0.0	0.10%	0.50%	1.0%	5.0%	11.0%	15.0%
Breaking load of dry film, kg.....	2.90	3.20	3.52	3.63	4.15	2.06	1.47
Comparison with untreated film (=100).....	100.00	110.2	121.1	125.4	141.3	71.0	50.7
Elongation of dry film.....	19.16%	13.27%	9.05%	7.05%	2.84%	1.91%	1.17%
Mullen bursting strength, lb. per sq. in.....	17.39	15.70	16.71	18.65	15.51	9.80	9.25
Comparison with untreated film (=100).....	100.0	90.6	96.0	107.1	89.3	56.2	53.2
Time required to dissolve in water at 20° to 25°C., seconds.....	40	70	240	1200	1900	4500	7800
Temp. = 80°F. R.H. = 45%.							

Fig. 2—Wet-Strength Improvement of Paper Towels Treated with Glyoxal

	Untreated Paper	100 Parts Hydroxyethyl Cellulose, 20 Parts Glyoxal	100 Parts Hydroxyethyl Cellulose, 100 Parts Glycerine, 40 Parts Glyoxal
Dry Pickup (% of towel weight).....	42 sec.	0.81%	0.81%
Wetting Time (Tap water at 20 to 30°C.).....	42 sec.	6.9 sec.	11.6 sec.
Dry Bursting Strength (82°F. RH = 43%).....	7.22 lb./sq. in.	7.48 lb./sq. in.	7.47 lb./sq. in.
Comparison of Dry Strength (Untreated Paper = 100).....	100	103	103
Wet Bursting Strength (30 sec. 50°C.).....	1.77 lb./sq. in.	2.56 lb./sq. in.	2.40 lb./sq. in.
Comparison with Wet Strength of Untreated Paper (=100).....	100	144	136
Comparison with Dry Strength of Untreated Paper.....	24%	35%	33%
Wet Bursting Strength (30 min. 50°C.).....	1.56 lb./sq. in.	1.60 lb./sq. in.	1.66 lb./sq. in.
Comparison with Wet Strength of Untreated Paper (=100).....	100	102.4	106

degrees of water insolubility are obtained by altering the proportion of glyoxal incorporated (see Fig. 1). Glyoxal in direct contact with paper fibers tends to embrittle them, so the glyoxal and "Cello-size" solution are mixed prior to the impregnation of the paper. The aqueous solution can be made up and stored indefinitely since the final reaction does not take place until the water is evaporated and the paper is dried. A "Cellosize" glyoxal mixture is applied as an additive to paper in such a way that the effect is not permanent and the reaction product slowly hydrolyzes in cold water, with a gradual decrease in wet strength. For certain paper products, such as paper towels and toilet tissue, this is a definite advantage as it insures economical recovery of the paper "broke" or scrap as well as disintegration of the paper on disposal. A single impregnation of high-grade paper toweling yields a product with its dry weight increased 0.8 per cent and its wet strength (Mullen tester) increased 144 per cent over the untreated toweling. The wet strength of this toweling was 35 per cent of its dry strength. At the same time, the absorbency of the towel, as measured by the time required for complete wetting of the paper, was actually increased at least six times (see Fig. 2).

In addition, paper sized with a "Cello-size" hydroxyethyl cellulose, glycerine, and glyoxal coating can be made resistant to the penetration of printing inks, varnishes, lacquers, lubricating oils, and most solvents. Because this treatment prevents wicking of such materials into paper, it is particularly advantageous for producing extremely glossy and spot-resistant as well as ink-repellent finishes on labels and for decreasing the amount of ink that need be applied to paper surfaces. Cellulosic surfaces often differ in character so that coating solutions penetrate certain types of paper differently. The addition of about 0.1 per cent of amine 220 by volume often prevents soaking into the paper. Fiber containers and grease-proof paper tubes lined with this film have held lubricating oil, ethylene dichloride, and other solvents for two years without leakage. These containers are impervious to organic materials in both the liquid and the vapor phases and hence prove of immense value for the packaging of coffee and other aromatic substances. Wood, leather, rubber, and concrete surfaces can also be given a temporary resistance to penetration of oily materials by the "Cellosize" glyoxal coating.

#### MIRROR-SILVERING

A high-speed method of making mirrors has recently been developed and involves the spraying of a stream of ammoniacal silver nitrate together with a stream of a reducing solution from a double-barreled spray gun in such a man-

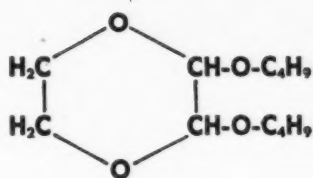
ner that a deposit of silver film forms on the glass.<sup>6</sup> In this spray application, a rapid reducing action such as that obtained with hydrazine sulfate is necessary; while in the older method of depositing silver from a bath, a slow reducing agent, such as Rochelle salts and invert sugar, is required. Glyoxal is intermediate in rate of reduction between these extremes and can readily be used for both types of application.

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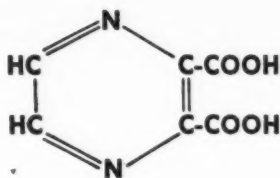
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Figure 3

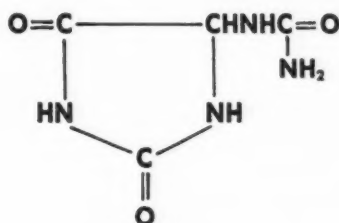
### Glyoxal Derivatives and Related Compounds



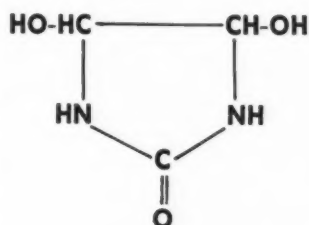
Dibutoxydioxane



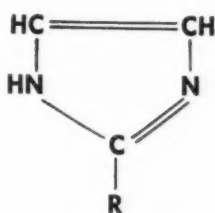
Pyrazine-2,3-Dicarboxylic Acid



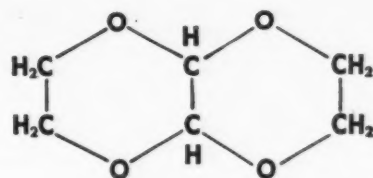
Allantoin



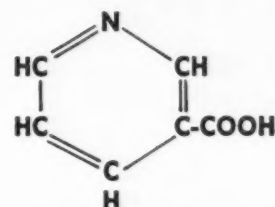
Acetylene Monoureine



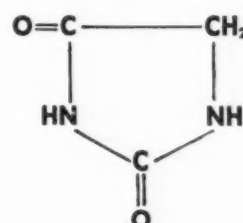
Glyoxalines



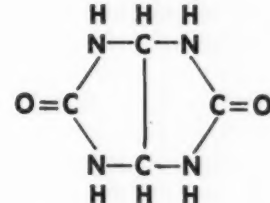
Naphthodioxane



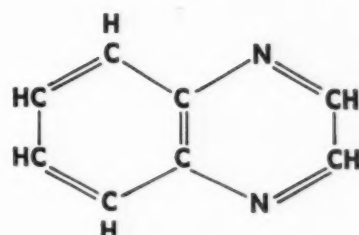
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# PRODUCTION CONTROL SYSTEMS

## Pare Specialty Costs

by D. W. THOMAS, Production Division Manager  
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**THE EMPHASIS FOR MANY YEARS HAS BEEN on the marketing of chemical specialties with but little attention paid to the production side of the business. Overlooked have been the economies well-reasoned manufacturing systems can effect, economies which assume even more importance as competition becomes keener.**

**I**N THE past few years nearly all companies have placed primary emphasis on production at any cost. For, particularly during the war period, it was necessary to maintain maximum output regardless of expense. In the specialty field this was especially true. Many organizations had invested heavily in brand-name advertising over the years, could not afford to lose customers through a lack of their products on the market. But the end of this cost-subordinating attitude is now becoming evident. More and more attention is being paid to manufacturing costs as more competitive days loom.

But paring production costs is not simple or easy. Wages have risen. Raw material prices are up. Labor turnover, absenteeism, and tardiness have hit all-time peaks in the past few years. All these factors have meant basically higher production costs, and under present conditions most of these expenses are relatively

fixed. Thus the major hope for realizing operating economies lies in efficient production control. Hence many companies are now reviewing production systems, investigating ways and means of upping output and reducing manufacturing costs.

### BASIS FOR PLANNING

The basis for any effective production planning system is the sales budget, or as it is sometimes termed, estimate. Appraised of anticipated sales the production man can formulate his needs—of raw materials, packages, number of employees—and compute the required operating days. Correspondingly the mount of stock needed to meet the sales budget can be calculated and orders can be placed with the appropriate delivery dates specified.

This last mentioned feature is important, for it must be borne in mind that the most efficient manufacturing method is to have raw materials and packages received in the plant, processed, and shipped as finished merchandise almost simultaneously. This is, of course, the ideal circumstance and seldom realized. Nevertheless it is the goal of all production men. Naturally a safety factor has to be maintained so that production is at no time hampered by a shortage of supplies on hand. To this end it is necessary to set up a control system so that at any time the inventory situation can be readily analyzed and adjustments made so that the even flow of work will not be disrupted.

Such records should cover all the individual items used in manufacturing, together with an estimated minimum and maximum of stock required. In establishing maximums and minimums the delivery schedule of the supplier, time in transit, storage space needed, and the turnover of finished stock must all be considered. Although it is obviously easier to schedule production by carrying a large inventory of raw materials it is also costly. It is

expensive from the standpoint of capital tied up, storage space, and material handling.

The last mentioned factor is often overlooked, but many expenses accrue when heavy inventories are carried, mainly as a result of the fact that material is handled too many times. From a handling standpoint nothing can be cheaper than to have the raw materials received, immediately run through the production lines, and shipped.

From the detailed record system suggested much pertinent data are obtained—e. g. material on order, quantities received, balance due, delivery time, daily or weekly balance of material on hand, maximum and minimum requirements, and estimated daily, weekly, or monthly usage in manufacture. Quite elaborate systems have been used for production control and probably no two are alike. The prime requisite, however, is that they do not become cumbersome. Too complicated a system can cost more to operate than the saving resulting from more efficient manufacturing operations.

### EQUIPMENT UTILIZATION

Where it is impossible to produce the same item on the same machine at all times, production control problems are more complex, for set-up time must be considered. Schedules must be carefully planned so that too many set-ups do not occur simultaneously. Such set-up periods can be—dependent upon the type of operation—either fairly long or short. Furthermore, even though maximum mechanization of a production line is sought as a means of reducing production costs, it must be appreciated that costs may actually be higher if too long a set-up time is required between runs. In addition the attendant expense of a larger mechanical maintenance force cannot be discounted.

Another factor to be considered in the drafting of a production schedule is the desirability of providing for "spare items." Thus, if a major mechanical breakdown occurs the employees can be shifted immediately to spare lines. In some cases two identical pieces of equipment are installed in the same production line so that if one breaks down the other can be used while repairs are being made. This allows



The ideal condition is to have raw materials received, processed, and shipped within a day.

the line to operate as a unit and eliminates the necessity of moving employees to other lines. However, the purchase of two duplicate machines for the same production unit involves careful analysis and a close weighing of the gain in output versus additional capital invested.

### SCHEDULING EMPLOYEES

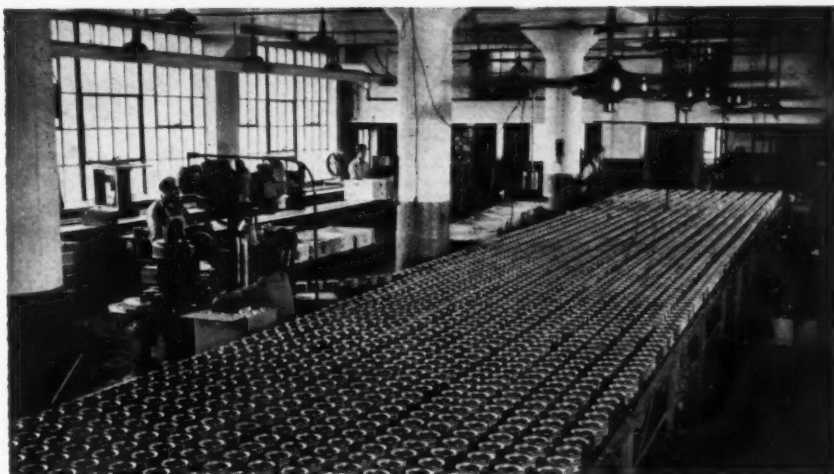
Two methods can be used for scheduling workers to various production lines. Where the operation is intricate employees are hired in advance for these jobs and continue in such posts day in and day out. This, in the writer's opinion, is the better procedure, even though, when absenteeism is prevalent, additional employees must be trained for fill-in work. The second method calls for the rotation of employees from one job to another. This necessitates training all employees for all jobs but eliminates the absenteeism factor in production scheduling. The pros and cons of both practices can be discussed from many angles, but by and large the type of manufacturing operation governs selection of the system.

One simple plan for production scheduling, where a number of lines are running on various products, is as follows:

After the estimated required production has been determined (for simplification the month will be used as the time period) each item to be made during the month is scheduled to certain lines. Knowing the daily output capacity and the number of employees needed, the working days necessary to meet the production quota is readily ascertained. If, as is often the case, an item requires more production days than there are in the month it is necessary to split output over several lines. Where a large number of items are being run such a scheduling problem is complex and can best be simplified by plotting the information at hand on ordinary graph paper (Figure A).

The numbers along the ordinate represent the production lines, whereas those on the abscissa denote production days. Horizontal lines are drawn from the ordinate to the number on the abscissa which corresponds to the total estimated working days required for that line. As has been noted previously it sometimes becomes necessary to make changeovers of products from line to line. If this can be done on a non-productive shift there will be no idle time charged against the production line, but in most cases where machines are running steadily on a double or triple shift, changeover periods must be deducted from the available productive days. This, too, can be shown graphically, and such a procedure permits ready appraisal of conflicting circumstances, as for example too many changeovers in one day.

On the right of the chart opposite the line number, the number of employees scheduled for that line is placed. In reading chart A, as an example, one can



Mechanized production lines offer many advantages, if they are well utilized. But economical operations can only be attained by weighing set up time and equipment adaptability.

readily see that line #1 operates with three employees. It operates five days before a one day changeover to another item. It then operates seven more days on this new item before another changeover. The same reasoning holds true for the other lines. This chart is not the finished schedule, for if it were, 25 employees would be needed for the first five operating days and only nine employees on the twentieth operating day.

The next step is to consolidate this chart into one where the number of employees is the governing factor. Again the abscissa represents the number of productive days in the month. Figure "B" is drawn by making a combination of all the lines having the same number of employees needed for the efficient operation of the plant for the month.

Chart "B" then shows the following facts:

1. Maximum number of employees needed is 20.

2. Lines #6 and #2 will run all month without changing products. Line #5 will run all but two days of the month.
3. There will be three changeovers during the month.
4. Where there are the same number of employees scheduled to various lines such as lines #7 and #1, and #4 and #3, then the daily schedule can have some flexibility. In other words, the schedule for the first five days could be lines #5, 6, 7, 2, and 4 or lines #5, 6, 1, 2, and 3. In either case the same total number of employees would be needed for operation.

In order to adhere as closely as possible to a schedule, the production rates have to remain within the estimated average daily rates. If these fluctuate too much then the scheduling becomes more difficult. Therefore, it is up to the production department to keep records that will aid in the schedule planning.

Figure A

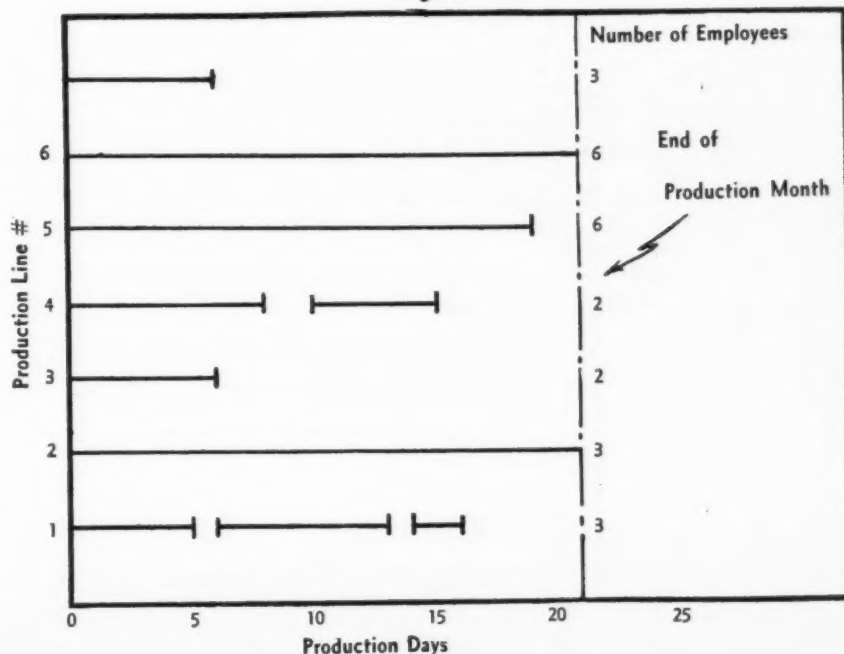
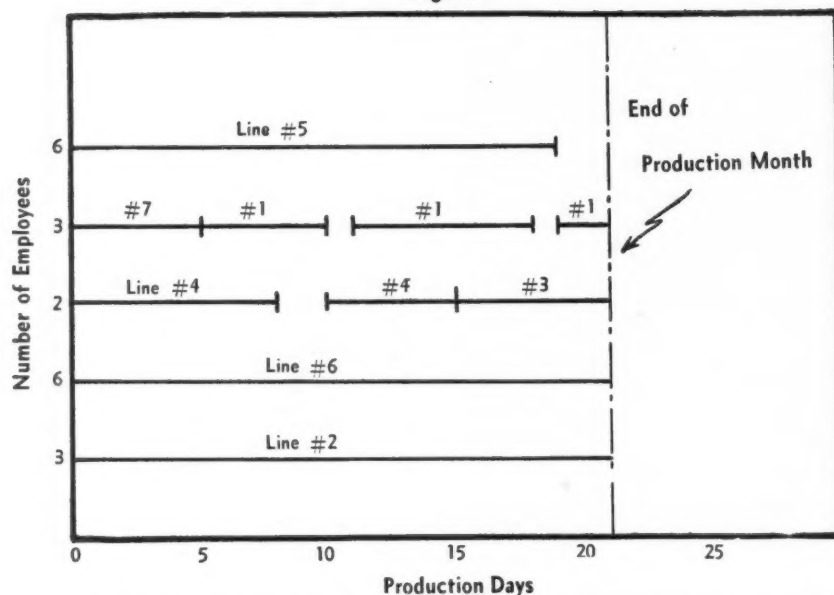


Figure B



#### ADDING NEW PRODUCTS

When starting to produce a new product, several methods can be employed to determine the amount of output. In plants where time study is not utilized one may estimate the output by comparison with another similar product that has been run in the past. Time study is the best method for determining the most profitable output and substantial savings can be realized thereby.

On production lines that are already in operation and where no efficiency records have been kept an easy method can be utilized to increase production and lower costs. Certain automatic lines are synchronized so that all operations run at the same speed. Without making an initial time study the operating speed of the line can be used as the standard rate. Also the number of employees can be set and this becomes the standard. For calculating efficiency percentages, these two factors have to remain constant.

Dividing the number of employees on the production line by the units produced per minute, yields "standard minutes per unit." After the daily production has been tabulated, "operating minutes" is obtained by multiplying the units of production by the "standard minutes per unit." The "productive minutes" is determined by multiplying the number of employees by the actual minutes each employee spends on the production line. If the "operating minutes" equal the "productive minutes" the line efficiency would equal 100 per cent. This rarely, if ever happens. On the other hand, if the "operating minutes" were half the "productive minutes", then the percentage would be 50. In this case these is definitely lost time. This can be due to many factors, such as, machine breakdown, running out of material, poor material, etc. Lost time is only recorded if the employees remain on the production line during the shutdown. If all the down time is recorded the sum of the "lost minutes" plus the "operating minutes" should

equal the "productive minutes." This would then be 100% labor efficiency, as the "lost minutes" is through no fault of the operators. For less than 100% labor efficiency all of the lost minutes would not have been accounted for.

Often labor efficiency will equal 100% and sometimes it will go over 100%. The latter is obviously impossible and means that too much down time has been recorded.

A system of this nature permits the production man to get to the root of his troubles. Lost minutes can reflect poor planning or scheduling, inefficient maintenance, need for new equipment or the need for better material control. These results often bring to light the need for speeding or slowing down the operations on the production line in order to obtain either better efficiency or more production with the same efficiency. A system of this nature will definitely show results.

Attacking the problem from another angle, a set of records on the "dozens per operator per hour" can be kept. The switch from units to dozens and minutes to hours should be noted at this time. In the efficiency method explained above, the same efficiencies could be derived had dozens and hours been used. This is a matter of choice and depends upon the operations of the manufacturing plants. If the production output reaches a high figure, then units become too cumbersome for the reports. Likewise, some plants pay and figure costs to the nearest quarter hour; therefore, it becomes unnecessary to calculate in minutes.

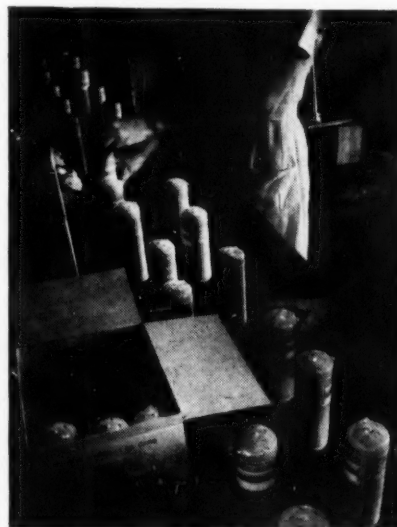
In calculating "dozens per operator per hour" all that is necessary is to divide the total dozen output by the operator hours. By keeping a daily record of the results the production manager can readily note improvements or vice versa. Even when using this system some form should be used for recording down time so that an explanation can be given for a loss in dozens per operator hours.

Quite often it is necessary to increase production on lines that are not too mechanized and depend mainly on hand operations. By putting more operators on the hand jobs so that the machinery can be speeded, the dozens per operator per hour economically should decrease. If it does not, then the speed-up is more costly. When working with these figures (dozens per operator per hour) one also has to bear in mind the required production for the line. For example, if it were required to run 8,000 dozen on a line per day for every operating day in the year with 10 employees for an 8 hour day the dozens per operator per hour would theoretically be 100. If this could be done with 9 employees then the dozens per operator per hour would be 111. This naturally would be more economical. On the other hand if these 9 employees made only 100 dozen per hour per operator, the same efficiency as in the first example would be obtained but production needs would not be met.

#### INCREASING PRODUCTION

In the foregoing examples nothing has been said about the actual money cost of production. The only terms used have been dozens, units, hours, minutes, and operators. From these terms and results it is easy to figure the direct labor cost of a product as is usually done by the accounting department. Even though the production man has to watch cost figures it is better for him to use terms that will always remain constant such as minutes, hours, etc. Watching costs is important, however, because quite often wages, overhead, and raw materials prices increase.

Such increases in basic cost are not the responsibility of the production man and usually fall within the province of other departments. Nevertheless an astute production man will pay close heed to such manufacturing expenses so that he may make appropriate recommendations to offset higher charges.



Careful time study provides the best means of setting output rates on hand-operated lines.

# MORE SODIUM SULFATE NEEDED

EDITORIAL STAFF REPORT

**RAPID GROWTH OF THE KRAFT PULP and synthetic detergent industries has made severe inroads on sodium sulfate supplies. It is hard to realize that this waste product has achieved the dignity of a chronically scarce chemical.**

SINCE the discovery in 1879 by Dahl of the kraft process for the pulping of long-fibered wood, sodium sulfate\* has gradually grown in stature from a waste product—formed, for example, in the manufacture of nitric acid from Chile saltpeter and sulfuric acid—to a scarce commodity.

As late as the mid-twenties the consumption of salt cake for kraft was hardly greater than that for rayon and textile manufacture: about 100,000 tons for each in 1927, when the total output was about 350,000 tons.

The 1946 situation, however, offers a marked contrast: kraft took nearly four-fifths of the 900,000 tons consumed. What of 1948, when 100 per cent operation of the expanded capacity as estimated by the U. S. Pulp Producers Association will take 810,000 tons—90 per cent of the 1946 total? Obviously further supplies will be required if new plants, now under construction, are to operate.

## POSSIBLE SAVINGS

As first used in the Scandinavian countries, the kraft process was based on the cheap salt cake supplies available from England, where it was a by-product of heavy chemicals manufacture.

In operation the salt cake is reduced with carbonaceous material, usually sawdust, to produce the alkali necessary for the separation of lignin and cellulose in the pulp. The product of this reduction is a complex mixture of sodium sulfide, sodium carbonate and sodium hydroxide, the composition of which varies consid-

erably with the conditions of the reduction and the analysis of the salt cake charged to the furnace. Solution of the reduction product gives the cooking liquor, which is recovered and recycled after use.

It has been estimated that electrostatic precipitators, now being used on most of the new installations, will reduce salt cake requirements about 20 per cent below the present requirement of 1 ton per 7½ tons of pulp. A further 20 per cent reduction is expected in the newer pulp mills as a result of process improvements and better housekeeping around the mill.

## OTHER USES

While kraft is its largest output, sodium sulfate has other important uses, as shown in Table I. It is used for salting out dye baths, in the manufacture of glass and ceramics, for smelting copper-nickel ores (in Canada) and in the production of many heavy chemicals such as sodium alum and sodium silicate.

A new and rapidly expanding use is as a diluent in many of the powdered synthetic detergents that are now being marketed. If detergents were put up as pure materials, the small amounts that the housewife would have to measure out would render their use with optimum efficiency and economy quite impracticable. Some 50-75 per cent sodium sulfate is often added, therefore, as a bulking agent. Improvement in detergent action is also claimed for the added ionic material.

Estimates of ultimate detergent production range up to a billion pounds a year. If this quantity is diluted with an average 50 per cent of sodium sulfate, it is obvious that the market for this use may reach 250,000 tons per year. Such an estimate is fraught with uncertainty, however, for there are factors operating toward a lower figure: A recent report has it that a large part of the detergents will be mixed with soap solution before

spray drying in existing soap plant equipment. Any appreciable swing, moreover, to liquid detergents of the polyethylene oxide type will reduce the above figure by the proportion they constitute.

## SUPPLIES

An additional 200,000 tons per year is a conservative estimate of the production increase necessary by the end of 1948; otherwise a major proportion of the expansion anticipated for kraft pulp and detergents cannot be realized.

Whence can this increase come? Because there is a shortage right now, it can be safely assumed that most of the "waste" sodium sulfate arising from present chemical operations is being used. For example, it is estimated that the recovery of sodium sulfate values from viscose rayon spin-bath liquor has made up in part—to the extent of 100,000 tons per year—the curtailed imports from Germany, which started dwindling after 1937. In this connection, one kraft mill operator offered to enter into a long-term contract with a viscose plant to purchase the relatively dilute spin-bath liquor and ship it to his mill for use. All concentration costs were to be borne by the paper mill.

There is much interest in the possibility of getting more sodium sulfate from natural sources. At present 70 per cent of the natural sodium sulfate comes from one producer: American Potash & Chem-

(Turn to Page 1050)

\* The term sodium sulfate includes salt cake (technical anhydrous), Glauber's salt (the decahydrate) and anhydrous sodium sulfate (purified salt cake).

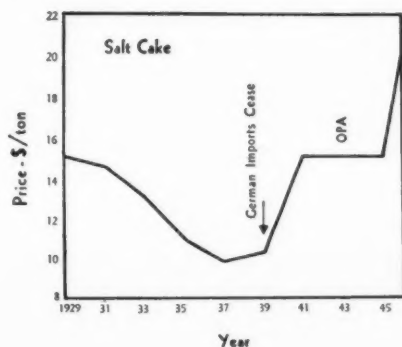
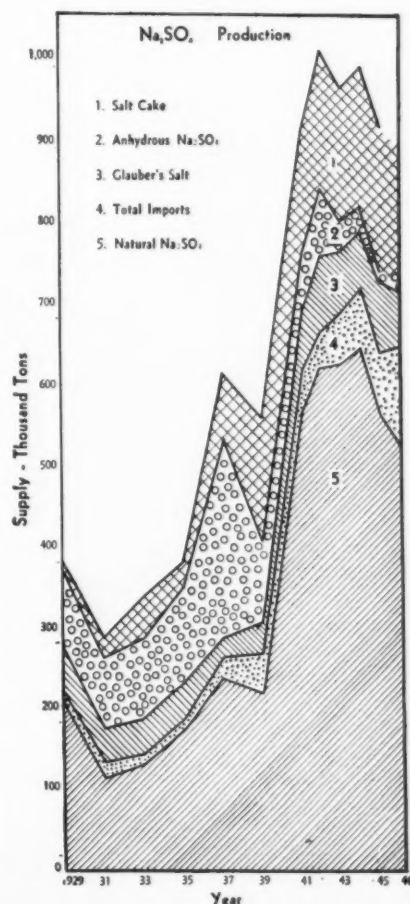


TABLE I  
Estimated  $\text{Na}_2\text{SO}_4$  End-Use Distribution, 1946

Use	Tons
Paper and pulp	710,000
Textile	75,000
Glass and ceramics	50,000
Heavy chemicals	50,000
Other	45,000
Total	930,000



# Continuous Wood Distillation Gives Better, Cheaper CHARCOAL

by ROBERT S. ARIES, Chemical Engineer  
Brooklyn, New York

**A CONTINUOUS WOOD DISTILLATION PROCESS may revitalize domestic industry and enable it to compete with foreign producers in supplying charcoal, an indispensable item in metallurgy and CS<sub>2</sub> manufacture.**

**D**ISTILLATION of wood is one of the oldest chemical operations; yet progress in its techniques has been slow. Processes now predominating are still inefficient and differ little from the ones of the ancient Egyptians, who recovered not only charcoal, but also tars and pyroligneous acids, which were used for embalming. The predominant product of wood distillation, however, was charcoal, and it was not until the late 1800s that it became the chief source of acetic acid, methanol, acetone, tars and wood oils.

## NOT ENOUGH RESEARCH

The importance of the industry was not challenged until the 1920's when synthetic acetic acid and methanol were introduced.

This new competition prodded some wood distillers into applying sounder engineering principles, improved marketing practices and better wood cutting operations. But in general the industry, not as research-minded as the chemical industry which it antedated, failed to exercise the adaptability characteristic of—to take an example—the coal-tar industry, which was started and operated by chemists.

As a result, wood distillation has gradually declined from its peak during World War I. During the 1930's and since the end of the critical phases of World War II, a large number of plants have shut down.

Many causes contributed to the decline: supplies of wood near the mill dwindled as a result of unwise cutting practice of the past; increased cost of labor was not coupled with corresponding increases in productivity or application of labor-saving machinery; solvents from petroleum and other sources made continuous inroads; and many of the operators displayed relative lack of interest in "face-lifting" the industry.

Face to face with even harder times, wood distillers, by adapting sounder processes and methods, may well be able to remain in the permanent picture of the American economy. There are, in fact, opportunities for new plants, if proper cutting, manufacturing and marketing

techniques are utilized. There are numerous opportunities, moreover, for plants outside the United States.

## SWISS PLANTS POINT WAY

Improved engineering principles are embodied in the continuous process employed by two Swiss plants, one of which has been in operation since 1942, the other since 1943.

The set-up of these plants is shown schematically in the flow chart: Wood of proper sizes is continuously fed into a vertical oven by means of an airtight loading device. Against the current of pyroligneous acid, which slips downwards in the oven, a stream of hot inert gas rises upwards through the wood. This circulating, or rinsing, gas surrounds every piece of wood, gives off its heat to the wood and thereby heats it to the carbonization temperature. At the same time the rinsing gas, the tar, wood alcohol and acetic acid vapors rise out of the hot oven zone. Rising further in the oven the gas warms and dries the wood charge, extracts considerable portion of the moisture of the wood and leaves the top of the oven at a temperature just above 212°F.

The finished, hot charcoal is continuously withdrawn from the oven at the bottom by means of a removal device and collected in thoroughly cooled containers. The gases left in the oven during the gas circulation process are mixed with the gases used for heating the wood and are then, in the same way as with the retort charring process, taken through the tar remover, cooler and other equipment where the wood tar and acetic acid water are condensed.

Based on several years' operating data of the Swiss plants, a pilot plant has been built at the Polytechnic Institute of Brooklyn, and the design of a commercial plant has been proposed. Details of the design are embodied in a recent publication.\*

## PROPOSED AMERICAN DESIGN

The proposed installation produces 5½-8 tons of charcoal with the use of hardwood in the form of thin round pieces up to 6 inches in diameter. The plant requires 20 workers including those engaged in transportation and packaging.

Gas is heated with parts of the detarred furnace gas and the mixture blown into the charcoal furnace. Thus it is possible to manage the fire with about 5 percent of the charge. For the production of extra rinse gas in emergencies, wood coke, oil, tar or similar fuels can be used.

The power requirements of the factory are about 150 kilowatt hours daily for a charcoal production of 5½-8 tons. For chipping the wood 180 kilowatt hours daily are used.

The wood to be carbonized is brought to a chopping machine by means of a field railroad, which throws the wood through a conveyor into a wood bin. In place of the chopping machine a saw or a suitable cleavage machine can be used. The wood reaches the loading opening of the charcoal furnace by means of another conveyor.

The heating gas is produced in a gas generator, burned, and by mixing with the cooled furnace gas brought to the proper temperature and put into the furnace.

The finished charcoal is brought through a discharging device into a cooling vessel. After a suitable cooling period it is brought to a charcoal hopper and emptied. The coals are then lifted to a sorting sieve by means of a bucket conveyor where, after being sorted by size, they fall into sacks. Here the charcoal is bagged and is ready for shipping.

The circulating gases blow into the

\*"Wood Distillation," Bulletin No. 15, Northeastern Wood Utilization Council, P. O. Box 1577, New Haven 6, Conn.



Continuous wood distillation plant in Ticino, Switzerland.

charcoal furnace mix with the vapors of the liquid by-products and are sent into the wash towers. The separated tar collects in a tar pit. The gas from the tar is sucked out by a ventilator which sends part of it back to the circulating gas structure and part through a chimney into the atmosphere. The continuous operation requires the following: one foreman, six workers on the charcoal furnace (two men per shift), three workers for chopping the wood, three workers on wood transportation, two workers on charcoal packaging, and helpers. Altogether there are 20 workers.

#### SEVERAL ADVANTAGES

1. The process is continuous. The wood to be charred is put into the top of the oven and the charcoal removed from the bottom. Also, the furnace gases are used in a homogeneous stream at a constant temperature of about 230°F.

2. The heat economy of the continuous process is appreciable. A heat requirement of 5 percent maximum of the charcoal yield is guaranteed with the use of air dry wood with an average moisture content of 20 percent. Instead of the retort wall becoming heated as in the retort operation, only the wood is heated.

3. The output of continuous charcoal operation, is more than twice that of a retort of the same volume. While about 5.25 cu. yd. retort chambers are needed for one daily batch of wood, an oven volume of only 2.2 cu. yd. is needed for a similar amount with the circulating gas furnace.

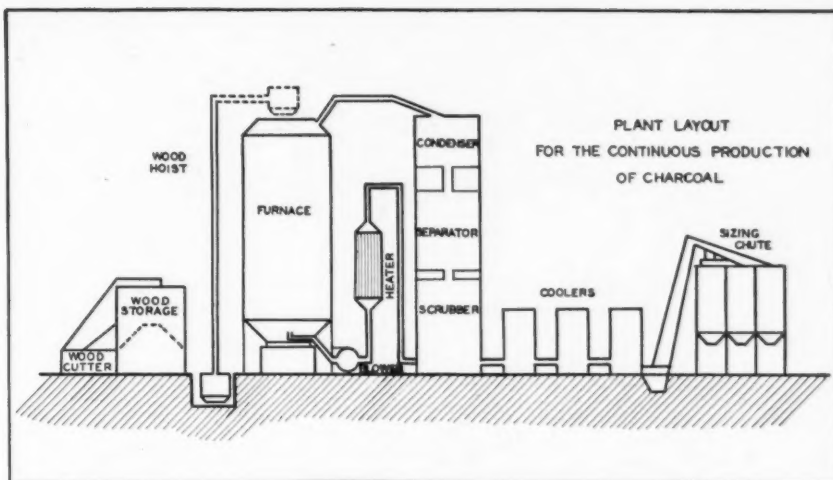
4. The furnace is cheap in comparison with retort operation; a smaller amount of iron is used. In contrast with the retort operation the following are omitted: Firing operations with installations and chimney; preheating retort wagon, locomotive or other means of pulling; track installation, removing platform and large cooling chambers.

5. Control is better. The charring rate and also the gas content of the charcoal can be exactly regulated according to specifications. Temperatures and pressures in the furnace remain automatically constant. The operation of the installation is limited by the amount of wood load, the discharging of the charcoal and occasionally the addition of generated gas.

6. The 20 per cent higher output and the simple performance of the installation indicate a substantial labor saving. Two men per shift can operate the furnace. The remaining personnel is used for sawing the wood, packaging and for manufacture of the liquid by-products.

7. The cooling period of the charcoal is short with the continuous operation, since small charcoal containers are used which radiate heat quickly.

8. All types of wood can be charcoaled. Cordwood and unsaleable wood are especially suitable. On the other hand wood rich in resin is also good for charcoaling



and yields a favorable turpentine output, since the circulating gas stream thins the tar vapors and drives them quickly and completely out of the furnace.

9. The circulating gas method produces the best yield both quantitatively and qualitatively. Charcoal with the maximum content of gas is produced; un-charred wood or tar remains in the charcoal never occur. The wood tar does not become pitched, as the tar vapors are removed from the charcoaling area as soon as produced and are protected against further destruction.

10. The operation of the charcoal installation of the continuous type is very clean. Piping does not become encrusted with pitch and tar coke, and maintenance is therefore kept at a minimum.

#### WHERE IT CAN BE USED

Charcoal installations of the circulating gas type can be built for daily outputs of 1-2 tons of charcoal up to 30 tons. The economy of the installation increases with the capacity. Solvent recovery does not pay for plants of less than 10 tons daily charcoal capacity.

Installations with daily outputs of 1-3 tons of charcoal should be erected in such a way that they can be dismantled and erected in another area. Those for over 3 ton production are built on permanent sites.

In existing charcoal installations of the retort type the substitution of the retorts alone is sufficient to give about the same efficiency as a circulating gas oven plant. The furnace gases are then brought to the present tar separators and coolers.

The metal saving aspects of the continuous process along with the profits accompanying reduced number of personnel and low heat requirements makes the circulating gas operation of the described construction well suited for new installations as well as for redesigning old ones.

Costs of production of ten tons of charcoal per day manufactured in a continuously operated furnace with internal heating are given in the accompanying table. For a charcoal capacity of ten tons per

24 hours approximately 20 cords of hardwood should be necessary, as shown in the calculations, including the fuel for heating the furnace. These yields and the costs involved have been calculated very conservatively. The plant investment cost is estimated at \$54,000.

#### Charcoal Production Costs

<b>1. Wood Cost:</b>	
20 cords (for 10 tons charcoal)	
@ \$10 per cord	\$200.00
<b>2. Labor:</b>	
6 men in 3 shifts on furnace 3 x 2	
3 men in 1 shift for woodcutting-machine	
3 men in 1 shift for transporting of wood	
2 men in 1 shift for sorting and packing coal, etc.	
1 man in 1 shift, mechanic for maintenance, etc.	
15 men, each hours work at \$.80	96.00
<b>3. Salaries:</b>	
1 chief supervisor, \$450 per month	15.00
1 foreman, \$300 per month	10.00
1 office employee, \$300 per month	10.00
<b>4. Miscellaneous expenses:</b>	
Material for maintenance and repairs	10.00
<b>5. Power and Water:</b>	
Electricity 400 kwh/24 h. at 1.5 cts.	6.00
Water for cooling purposes 20,000 gal.	
Other water 2,000 gal.	3.00
<b>6. Interest and Amortization:</b>	
15% per annum of \$54,000 (approx.)	24.00
Costs for 10 tons of charcoal, production of 24 hrs	\$374.00
Direct costs per ton of charcoal without recovery of by-products	\$ 37.40
Wood cost	20.00
Costs of conversion of wood into charcoal without recovery of by-products per ton of charcoal	17.40
Costs of conversion of wood into charcoal, per cord of $\left(\frac{17.40}{2.0} = 8.70\right)$	

With the type of plant under consideration a recovery of at least 90 per cent of the tar contained in the wood is reached; i. e., in case of hardwood approximately 6-7% of wood tar, referred to the weight of wood, are obtained. Despite predictions to the contrary ever since the early 20's, the American wood distillation industry is here to stay—but not by any divine right. The chemical industry is one of competitive processes and products, and its tempo of change is faster than most other industries.

The wood distillation industry may not only survive foreign competition, but even expand, if it applies modern techniques and becomes research-minded.

# BUSINESS PAPERS AND DIRECTORIES As Sources of Chemical Market Data

by FRANK WALDO\*

**BUSINESS AND TECHNICAL JOURNALS** and trade directories offer a wide variety of useful data and information to the chemical market researcher. With the growth of interest in industrial market research in general, many business publications have increased the amount of space they devote to material of special interest to market information.

**B**USINESS PAPERS and directories have played a vital part in the development, growth, and integration of industries throughout the world. In the United States their influence has been and is a force of steadily increasing importance. Their functions are manifold. In a broad sense they are designed to furnish industries and professions with information pertaining primarily to the fields they serve. To perform these services keen analysis of group and individual interests must be made. The subject matter contained in the publications must meet the needs of the readers for information on all phases of their industry, including raw materials, processes, construction, production, packaging, patents transportation, distribution company organizations trade association activities, financial and economic trends, personalities in the industry, and, perhaps most important of all, they must furnish reference and statistical data from which a clear picture of each industry, past and present, can be fashioned. All this is indispensable to the market researcher in establishing the relationship between products, classes of products, companies, and industries.

Through careful screening and preparation and by the integrity and accuracy of their information and statistics, business papers—or trade journals as they are sometimes called—have done and are doing work of the highest importance in making information available.

Judgment in the use of this information is up to the individual reader.

Chemical market researchers are concerned to a greater or lesser degree with many different industries. As it is im-

possible to keep up-to-the-minute data on all industrial activities and all products, it is imperative that the market researcher shall know where to go to find the information when needed.

Business papers and directories are of vital importance in this phase of marketing research. However, there are over 1,700 business journals in the United States and over 500 in Canada; also 150 business reference books. The chemical market researcher may be interested in as many as half or even two-thirds of these publications in the course of his investigations.

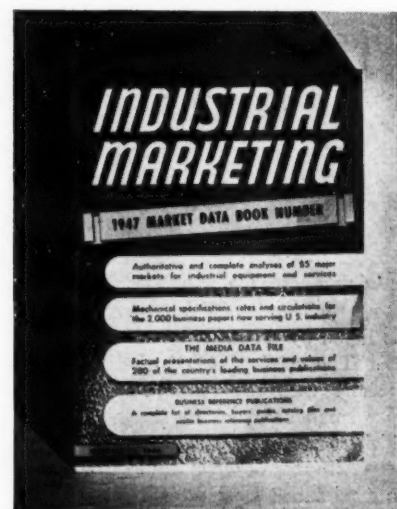
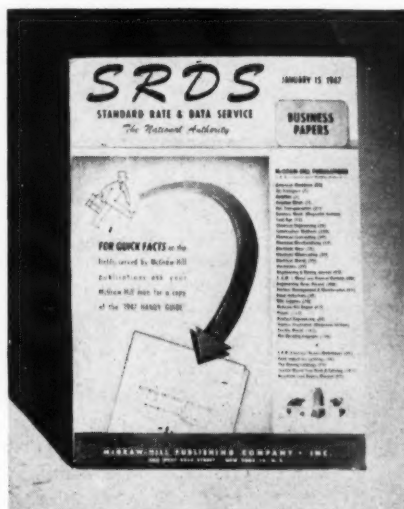
Obviously it is not possible for each market researcher to review all editions of all publications just to keep statistical records in case of need. Only certain data can be kept currently up-to-date. Other data must be sought as needed. At such times as these statistics are required, the

market researcher must know where to go for his information. Other articles of this series have outlined, capably and fully, data sources of various types. We are concerned now with business papers and directories and their importance to chemical market researchers.

There are four monumental works dealing with trade journals and trade directories:

- (1) *The Market Data Book Number of Industrial Marketing*, published each October by Advertising Publications, Inc., 100 East Ohio Street, Chicago, 11, Illinois, as the October issue of "Industrial Marketing". The "Market Data Book Number" is sold only by subscription to "Industrial Marketing".
- (2) *Standard Rate and Data Service*, published monthly at 333 North Michigan Avenue, Chicago, 1, Illinois; in four sections: (1) Newspapers, (2) Radio, (3) Business Papers, (4) Magazines, Farm Papers, Transportation Advertising. Subscription rate \$50.00, individual sections \$25.00.
- (3) *Ulrich's Periodicals Directory*, compiled by Carolyn F. Ulrich, formerly head of Periodicals Division of New York Public Library, and published triennially by R. R. Bowker Company, 62 West 45th Street, New York 19, N. Y., \$15.00 per volume.
- (4) *N. W. Ayer and Sons' Directory of Newspapers and Periodicals*, published by N. W. Ayer & Sons, Inc., Philadelphia, Pennsylvania. A guide to publications printed in the United States and its possessions, Philippine Commonwealth, Dominion of Canada and Newfoundland, Bermuda, Cuba, and the West Indies. Descriptions of the states, cities, and towns in which they are published; classified lists; 70 maps.

The above four publications have served as the basis of much of the information contained in this article. Chemical market



These two directories of business publications should be familiar to all market researchers.

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researchers are urged to become thoroughly familiar with their contents.

In "Market Data Book Number," "SRDS—Business Papers" and "Ulrich's Periodicals Directory", publications are classified under industrial groupings, and in the first two there are cross references to allied groups, thus making possible a quick survey of publications covering specific activities. The "1947 Market Data Book Number" carries a pertinent summary of the industry in each classification. This not only is of value to those not closely familiar with the scope of the industry, but in several instances the summaries contain valuable over-all statistical data.

Also, in the "1947 Market Data Book Number" the introduction to each industrial classification grouping carries a list of trade associations.

#### HOW BUSINESS PAPERS SERVE

Business papers and directories comprise one of the most important sources of information. They are a living part of the industries and professions which they serve. Their background data and statistics are importantly selective, yet comprehensive. Their awareness of trends and changes generally precedes actual development of the conditions by a considerable time. The economic conflict between products for similar end uses, or elimination of end uses by technological progress, frequently are forecast in the business press far enough in advance of widespread adoption to give the marketing research department time to analyze and appraise the situation, so that management can meet the competitive developments in advance, or at least with full vigor as they take place.

Advertisements are one of the most important parts of business papers and directories, as they indicate to the keen observer product developments and technological trends which have important bearing on future use of old and new commodities. Advertisements cannot be ignored by the wide-awake researcher.

The market researcher will be greatly aided by identification and classification, according to his own needs, of the business papers and directories available to him. Certain of these publications, especially among the journals, have more bearing on the executive end of the business than on the chemical or producing ends. However, it is advisable that the chemical market researcher be familiar with these publications and their coverage and that they be reviewed at least for the purpose of classifying pertinent data sources. Many publications in the banking and financial fields and in advertising, and many general publications, contain topical items or even complete economic studies of underlying conditions in some industry, or affecting some separate organization, which will be of great importance to the chemical market researcher in appraising conditions in fields as-



A representative group of business publications that carry chemical market information

signed to him for study. It is not practical to list all of the publications falling in the above category. Their titles and coverage can be learned quickly from the four reference books already mentioned.

Following is a checklist of some of the more important business periodicals and directories in fields that are of greatest interest to the chemical market researcher:

(Descriptive material on each publication is given in the following order: name of publication, address, frequency of issue, annual subscription rate, type of material contained.)

#### GENERAL

**Barron's** 40 New St., New York 4, N. Y.; weekly; \$10.00; articles on individual companies from business and financial angle, annual special issue on chemical industry.

**Business Week**, 330 W. 42nd St., New York 18, N. Y.; weekly; \$5; general commercial and economic news, reviews, digests.

**California—Magazine of the Pacific**, 350 Bush St., San Francisco 4, Calif.; monthly; \$2; organ of California State Chamber of Commerce; resources and industry of California.

**Commercial & Financial Chronicle**, 25 Park Pl., Box 958 Church St. Annex, New York, N. Y.; semi-weekly; \$35; financial and commercial news of value as a basis of estimating and appraising industrial conditions and economic trends.

**Dun's Review**, 290 Broadway, New York 8, N. Y.; monthly; \$4; summarizes general financial and economic conditions and trends.

**Financial World**, 86 Trinity Pl., New York 6, N. Y.; weekly; \$15; general financial magazine for investors, annual chemical review number each spring, publishes a list, "Chemical Product Tradename Directory."

**Forbes Magazine of Business**, 120 Fifth Ave., New York 11, N. Y.; semi-monthly; \$4; general business coverage.

**Fortune**, 350 Fifth Ave., New York, N. Y.; monthly; \$10; specializes in political, economic, financial, and frequently personality studies covering industries, products, cities, professions, etc.; articles contain much important and dependable factual information; "A-Z" index of Fortune articles especially valuable.

**Printer's Ink**, 205 E. 42nd St., New York 17, N. Y.; weekly; \$4; field of advertising and selling; important market surveys, index of advertising volume.

**United States News**, 24th & N Sts., N. W., Washington 7, D. C.; weekly; \$4; devoted to reporting, analyzing, and interpreting news of national affairs.

**World Report**, 24th & N Sts., N. W., Washington 7, D. C.; weekly; \$4; similar to U. S. News, but covering field of international and foreign affairs.

**Wall Street Journal**, 44 Broad St., New York 4, N. Y.; daily except Sun.; \$18; general financial and business newspaper, coverage includes chemical industry.

**N. Y. Journal of Commerce**, 63 Park Row, New York 15, N. Y.; daily except Sun.; daily business and market newspaper with special page devoted to chemicals, also several special chemical issues; gives daily market and price information on chemicals and allied products, news of chemical companies and products.

**Scientific American**, 24 W. 40th St., New York 18, N. Y.; monthly; \$4; each issue carries at least one feature article on industrial applications of chemical research as well as a number of shorter chemical items.

**Survey of Corporate Securities (Canadian)**, 481 University Ave., Toronto 2, Ont.; annually in Sept.; \$2; investment information on approximately 1,500 Canadian companies other than mining and petroleum.

#### ABSTRACTS

**Biological Abstracts**, University of Pennsylvania, Philadelphia 4, Pa.; bi-monthly; \$25; comprehensive abstracting and indexing journal of the world's literature in theoretical and applied biology exclusive of clinical medicine.

**British Bureau of Abstracts**, 9/10 Savile Row, London, W. 1, England; A-I General, Physical and Inorganic Chemistry; A II Or-

ganic Chemistry; A-III Physiology, Biochemistry, Anatomy.

*Chemical Abstracts*, American Chemical Society, 1155 16th St., N.W., Washington, D. C.; semi-monthly.

*Nutrition Abstracts & Reviews*, Imperial Bureau of Animal Nutrition, Rowett Institute, Aberdeen, Scotland; quarterly; 42s; abstracts, book reviews, index.

*Philosophic Abstracts*, Philosophical Library, Inc., 15 E. 40th St., New York, N. Y.; quarterly; \$4.

*Photographic Abstracts*, Royal Photographic Society of Great Britain, 16 Princess Gate, London, S.W.7; quarterly; 30s.

*Psychological Abstracts*, American Psychological Assoc., Inc., Prince and Lemon Sts., Lancaster, Pa.; monthly; \$7.

*Science Abstracts* (Sec. A—Physics; Sec. B—Electrical Engineering), Institute of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2.

*Monthly Abstract Bulletin*, Kodak Research Laboratories, Eastman Kodak Co., Rochester, N. Y.

*Metallurgical Abstracts*, The Institute of Metals, 4 Grosvenor Sq., London, S.W.1; monthly; sections on electrometallurgy and electrochemistry.

## INDEXES

*Agricultural Index*, H. W. Wilson Co., 950 University Ave., New York, N. Y.; monthly; \$12; cumulative subject index to agricultural periodicals, books and bulletins.

*Canadian Periodical Index*, Public Libraries Branch, Ontario Dept. of Education, Toronto, Canada; quarterly.

*Subject Index to Periodicals*, issued by Library Association; science and technology, 1916-22, 1918-26.

*Reader's Guide to Periodical Literature*, H. W. Wilson Co., 950 University Ave., New York 52, N. Y.; semi-monthly.

*World List of Scientific Periodicals*, Oxford University Press; published in the years 1900-1933.

*Engineering Index*, 29 W. 39th St., New York 18, N. Y.; annual; annotates articles, papers and reports from engineering, scientific and industrial publications, society transactions, publications of government bureaus, research laboratories, etc.

*International Index to Periodicals*, H. W. Wilson Co., 950 University Ave., New York 52, N. Y.; 6 times a year.

*Index to Labor Articles*, Rand School of Social Science, 7 E. 15th St., New York 3; bi-monthly; \$1.

*Index to Legal Periodicals*, H. W. Wilson Co., 950 University Ave., New York 52; monthly; \$16.

*Industrial Arts Index*, H. W. Wilson Co., 950 University Ave., New York 52; monthly; \$18; index of articles on business, finance, science, technology appearing in current journals; cumulative first three quarters, then annual volume.

*Quarterly Cumulative Index Medicus*, American Medical Assoc., 535 N. Dearborn St., Chicago 10, Ill.; \$12.

## CHEMICAL INDUSTRY

*Chemical Industries*, 522 Fifth Ave., New York 18; monthly; \$4; broad coverage of new developments within and affecting the chemical process industries, with special emphasis on economic and commercial aspects; occasional market studies on individual chemicals or groups of chemicals, also studies of requirements of major chemical consuming industries; May issue each year carries a special summary of annual reports of leading chemical companies; each issue contains more important government statistics on chemicals, selected list of current chemical prices, and complete listings and abstracts of recently issued chemical patents.

*Chemical Industries Buyers' Guidebook Number*, 522 Fifth Ave., New York 18; annual; included with Chemical Industries subscription or \$2 separate; a complete guide to sources of supply of chemicals, chemical raw materials, chemical specialties, containers, and chemical processing equipment; contains technical description and properties of chemicals listed, directory of chemical societies and trade associations, five-year summary of chemical prices, and a comprehensive index of chemical trade names.

*Chemical Engineering* (formerly Chemical & Metallurgical Engineering), 330 W. 42nd St., New York 18, N. Y.; monthly; \$3; chemical and chemical engineering economics, trade and industry statistics, chemical consumption and prices indexes; annual review and forecast issue in February; principal emphasis on chemical engineering.

*Chemical and Engineering News*, 1155 16th St., N.W., Washington, D. C.; weekly; included in American Chemical Society dues, \$2 separate; regular departments include markets, industrial news, from time to time features dealing with various phases of the industry.

*Industrial and Engineering Chemistry*, 1155 16th St., N.W., Washington, D. C.; monthly; \$4; two editions: industrial serving research chemists and chemical engineers, and analytical serving analytical chemists; emphasis on technical material.

*Chemistry & Industry*, 56 Victoria St., London, S.W.1; weekly; £2 15s; official news organ of the Bureau of Abstracts, The Chemical Council, Institution of Chemical Engineers, and the National Committee for Chemistry of the Royal Society.

*Chemical Engineering Progress*, 50 E. 41st St., New York, N. Y.; monthly; \$5; official organ American Institute of Chemical Engineers.

*Chemical Processing Preview*, 737 N. Michigan Ave., Chicago 11, Ill.; monthly; free to selected list in process industries.

*Chemical Engineering Catalog*, 330 W. 42nd St., New York 18; annual; free to selected list in process industries; contains manufacturers' catalogs.

*Science News Letter*, 1719 N. St., N.W., Washington 6, D. C.; weekly; \$5; reports new developments in general field of science.

*Commercial Fertilizer*, 75 Third St., N.W., Atlanta, Ga.; monthly; \$2; covers material of interest to fertilizer manufacturers and mixers.

*Soap & Sanitary Chemicals*, 254 W. 31st St., New York 1, N. Y.; monthly; \$3; covers soap and chemical specialties field.

*Oil, Paint & Drug Reporter*, 59 John St., New York 7; weekly; \$5; reports current market and price information, industry news.

*Sweet's File for Process Industries*, 119 W. 40th St., New York 18; annual to selected list in process industries; contains manufacturers' catalogs.

*Corrosion and Material Protection*, 1117 Wolfendale St., Pittsburgh 12, Pa.; bi-monthly; \$2; includes abstract service.

*Journal of the American Oil Chemists' Society* (formerly Oil & Soap), 35 E. Wacker Dr., Chicago, Ill.; \$4; chiefly for research chemists in oils and fats.

*Soap Blue Book*, 254 W. 31st St., New York 1, N. Y.; annual; included in subscription to Soap and Sanitary Chemicals; buying guide and statistical reference.

*Drug Topics Red Book*, 330 W. 42nd St., New York 18; annual to selected free list; directory to 115,000 items sold to and through the drug field.

*Naval Stores Review*, 433 W. Church St., Jacksonville, Fla.; weekly; \$5; covers naval stores industry and markets, with reports on production, consumption, stocks, and prices.

*American Chemical Society Journal*, 1155 16th St., N.W., Washington, D. C.; monthly; \$8.50; chemical research reports.

*American Ink Maker*, 254 W. 31st St., New York 1; monthly; \$3; organ of the National Association of Printing Ink Makers.

*American Leather Chemists Association Journal*, Univ. of Cincinnati, Cincinnati 21, Ohio; monthly; \$12.

*Journal of the Association of Official Agricultural Chemists*, 450 Ahnaip St., Menasha, Wis.; \$5.

*Calcium Chloride Assoc. News*, Calcium Chloride Association, Penobscot Bldg., Detroit 26, Mich.; bi-monthly; free; information relative to uses of calcium chloride.

*Canadian Chemistry and Process Industries*, 137 Wellington St., W. Toronto, Ont.; monthly; \$3.50; includes data on Canadian chemical industries.

*Chemical Age*, 154 Fleet St., London, E.C.4; weekly; 21s; devoted to industrial and engineering chemistry.

*Chemical Trade Journal and Chemical Engineer*, 265 Strand, London, W.C.2; weekly; 30s.

*Corrosion*, 318 Southern Standard Bldg., Houston 2, Texas; quarterly; \$3; organ of National Assoc. of Corrosion Engineers.

*Industrial Chemist & Chemical Manufacturer*, 33 Tothill St., London, S.W.1; monthly; 12s; devoted to applied chemistry and chemical engineering.

*Manufacturing Chemist and Pharmaceutical and Fine Chemical Trade Journal*, 17 Stratford Pl., London, W.1; monthly; 10s.

*Drug Trade News*, 330 W. 42nd St., New York 18; weekly; news of drug manufacturing industry.

*Drug & Cosmetic Industry*, 101 W. 32nd St., New York, N. Y.; monthly; news, economic and technical information on the drug and cosmetic industries.

*American Perfumer and Essential Oil Review*, 9 E. 38th St., New York, N. Y.; manufacture and merchandising of cosmetics.

## FOOD INDUSTRY

*American Miller and Processor*, 330 S. Weels St., Chicago 6, Ill.; monthly; \$2; covers grain storage, handling and processing.

*Baker's Weekly*, 45 W. 45th St., New York 19; weekly; \$3; specialized coverage of the baking industry.

*Food Industries*, 330 W. 42nd St., New York 18; monthly; \$3; broad coverage of economics and technology of food processing industries.

*Food Industries Catalog*, 330 W. 42nd St., New York 18; annual; free to selected list; buyers' guide to food processing materials and equipment.

*Food Field Reporter*, 330 W. 42nd St., New York 18; semi-monthly; news and technology of food processing industries.

*Frozen Foods Directory*, 330 W. 42nd St., New York 18; annual; directory of companies engaged in quick freezing.

*International Confectioner*, 80 Wall St., New York, N. Y.; monthly.

*Manufacturing Confectioner*, 400 W. Madison St., Chicago 6, Ill.; monthly; \$3; semi-technical coverage of the confectionery industry.

*Dairy Industries Catalog*, 1445 N. 5th St., Milwaukee 12, Wis.; annual; \$5; condensed catalogs of manufacturers of dairy product plant equipment and supplies, includes statistics on production of dairy products by months and states for 10 years.

*Who's Who in the Butter, Cheese & Milk Industries*, 173 Chambers St., New York 7; annual in Feb.; \$10.

*Who's Who in the Egg and Poultry Industries*, 173 Chambers St., New York 7; annual in June; \$10.

## COAL INDUSTRY

*Coal Mine Modernization Year Book*, The American Mining Congress, Munsey Bldg., Washington 4, D. C.; annual; \$2.75; carries selected reports on improved mining methods and practices.

*Coal Age*, 330 W. 42nd St., New York 18; monthly; \$3; devoted to the operating, technical and business problems of the coal mining industry, with much valuable statistical data; issues "Coal Age's Newsletter" periodically for sales executives concerned with the mining market.

*Coal Mine Directory*, 330 W. 42nd St., New York 18; annual; free to selected list; directory of coal mining industry, listing all mines in U. S. and Canada over 100 ton daily capacity with data on operations, includes state maps showing coal production by counties.

*Keystone Coal Buyer's Manual* (including Coal Mine Directory), 330 W. 42nd St., New York 18, N. Y.; annual; \$10; data on coal origin, location, production, selling agencies.

## OIL AND GAS

*American Gas Journal*, 53 Park Pl., New York 7; monthly; \$2; current research information on production and use of gas.

*American Gas Handbook*, 53 Park Pl., New York 7; every odd year; included in subscription to American Gas Jnl.; summarizes technical and engineering developments pertaining to gas industry.

*Butane-Propane News*, 1709 W. 8th St., Los Angeles 14, Calif.; monthly; \$2; technical articles pertaining to liquefied petroleum gases.

*Gas*, 1709 W. 8th St., Los Angeles 14, Calif.; monthly; \$2; technical articles pertaining to natural and manufactured gases.

*National Petroleum News*, 1213 W. Third St., Cleveland 13, Ohio; weekly; \$5; emphasis on marketing phases of petroleum industry.

*Oil and Gas Journal*, 211 S. Cheyenne Ave., Tulsa 1, Okla.; weekly; \$3; publishes annual statistical issue.

*Oil Reporter*, 730 17th St., Denver 2, Colo.; bi-weekly; \$4; covers the petroleum industry in the Rocky Mountain region.

*Petroleum Refiner*, 3301 Buffalo Dr., Houston 6, Texas; monthly; \$2; covers petroleum refining, petro-chemical and natural gasoline industry.

*Petroleum Register*, 2 W. 45th St., New York 19; annual; \$10; lists producers, refiners, gasoline manufacturers, lubricating oil and grease compounders throughout the world.

*Refinery Catalog*, 3301 Buffalo Dr., Houston 6, Texas; annual; \$10; buying guide on equipment and materials used in petroleum refining.

*Survey of Canadian Oil*, 481 University Ave., Toronto 2, Ont.; every other year; \$1; investors' reference book on oil and gas companies of Canada.

## PAPER INDUSTRY

*Lockwood's Directory of the Paper & Allied Trades*, 15 W. 47th St., New York 19; annual in Nov.; \$10; classified directory of the paper industry.

*National Directory of Canadian Pulp & Paper Industries*, Gardenvale, Que.; annual in Nov.; \$2.50.

*Paper and Pulp Mill Catalog*, 59 E. Van Buren St., Chicago 5, Ill.; annual in Sept.; free to selected list.

*Paper Industry and Paper World*, 59 E. Van Buren St., Chicago, Ill.; monthly; \$2; technical and business coverage of the paper and pulp industry.

*Paper Mill News*, 1440 Broadway, New York, N. Y.; weekly; \$4; publishes annual review number and annual chemical number.

*Paper Trade Journal*, 15 W. 47th St., New York 19, N. Y.; weekly; \$5; news, markets and technical developments in the paper industry.

*Paper Year Book*, 22 E. Huron St., Chicago, Ill.; annual; \$7.50; index and reference on kinds of paper products and their makers.

*Post's Paper Mill Directory*, 1440 Broadway, New York, N. Y.; annual.

*Source of Supply Directory*, Howard Publishing Co., 111 W. Washington St., Chicago 2, Ill.; annual in Dec.; \$2; sources of supply for all types of paper, paperboard and converted paper products.

*Technical Association Papers*, Technical Association Pulp & Paper Industry, 122 E. 42nd St., New York 17, N. Y.; annual; \$8; includes

(Turn to page 1012)

# THE CHEMICAL PANORAMA

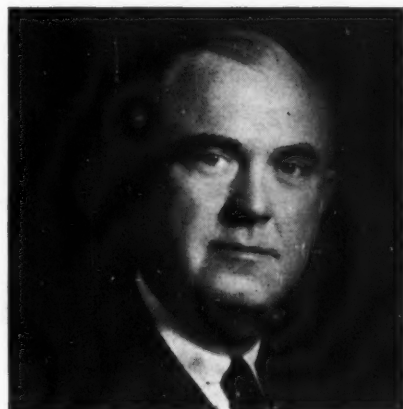
NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES



Carl S. Miner, who has been appointed to the board of directors of Universal Oil Products.



Hugh C. Minton, named production manager, Koppers Co. He has resigned from the Army.

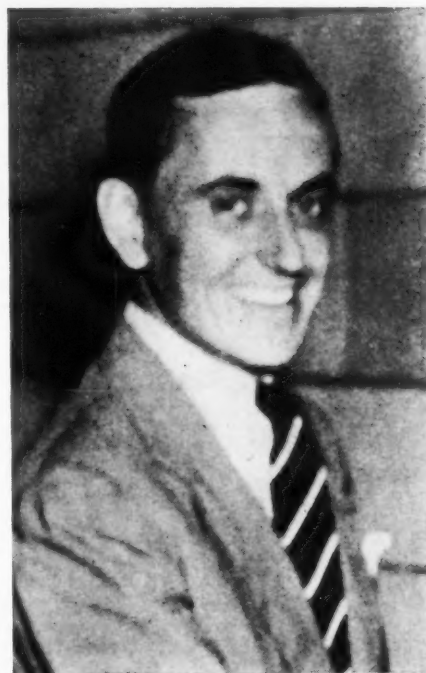


W. J. Murphy, elected to the board of directors of American Potash and Chemical Corp.



Paul H. Carnell, who has joined Leonard Refineries, Inc., as director of research.

## PEOPLE



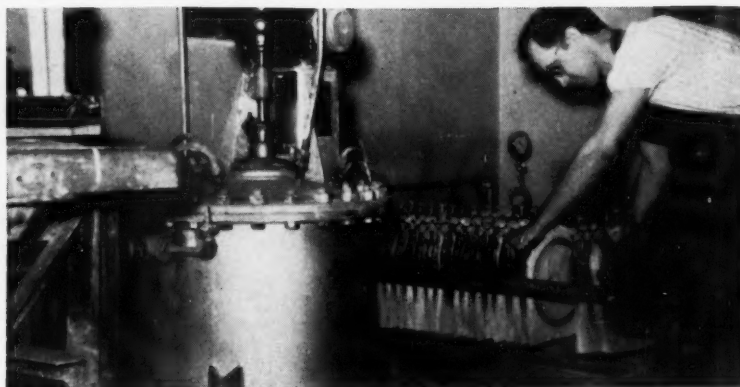
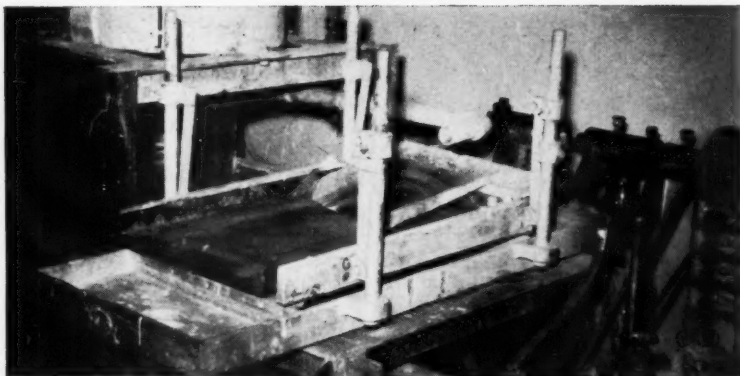
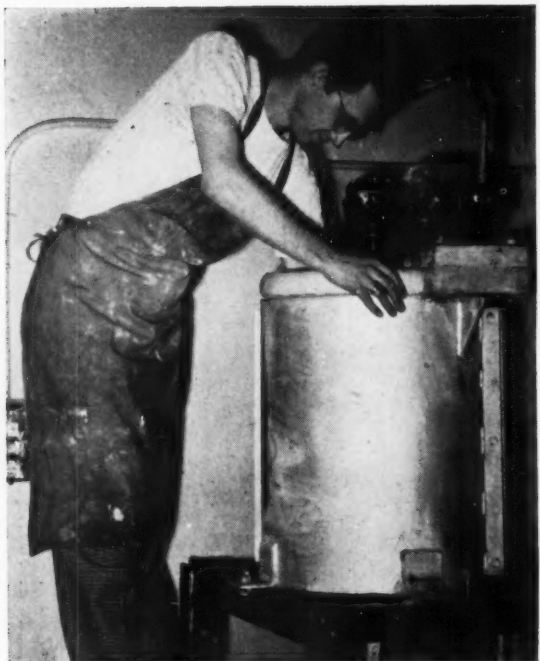
Raymond F. Evans, chosen president of Diamond Alkali Co. He joined Diamond in 1931.



Gaynor H. Langsdorf (right), recently elected vice president and director of Oronite Chemical Co., San Francisco, discusses plans with George L. Parkhurst, company president.



L. F. Marek (right), named vice president of A. D. Little, Inc., confers with H. B. Wissman.



## Leadless Ceramic Glazes

Shortage of lead during the war prompted the Engineering Experiment Station at Ohio State University to develop leadless ceramic glazes.

Oxides of barium, strontium, lithium and bismuth, and certain fluorides, either alone or in combination, replace the red or white lead conventionally present. Although these new glazes are not as easy to apply, articles so made are equal in most respects to lead-glazed products.

Since lead has again become available, potters have gone back to the older glazes. But Professor George A. Bole, director of ceramic research at the station, is mindful of the dwindling supplies of lead in this country: believes, potters will eventually have to turn to other materials.

After pug-milling (top-left) clay is shaped by Anne van Kleeck (far right), fired, then glazed with spray gun (below) and again fired (lower right). Articles are then subjected to tests.

Experimental ceramic production at Ohio State: Dick Steele blends ingredients (above left) after which they are screened (top) and filter-pressed to remove water.





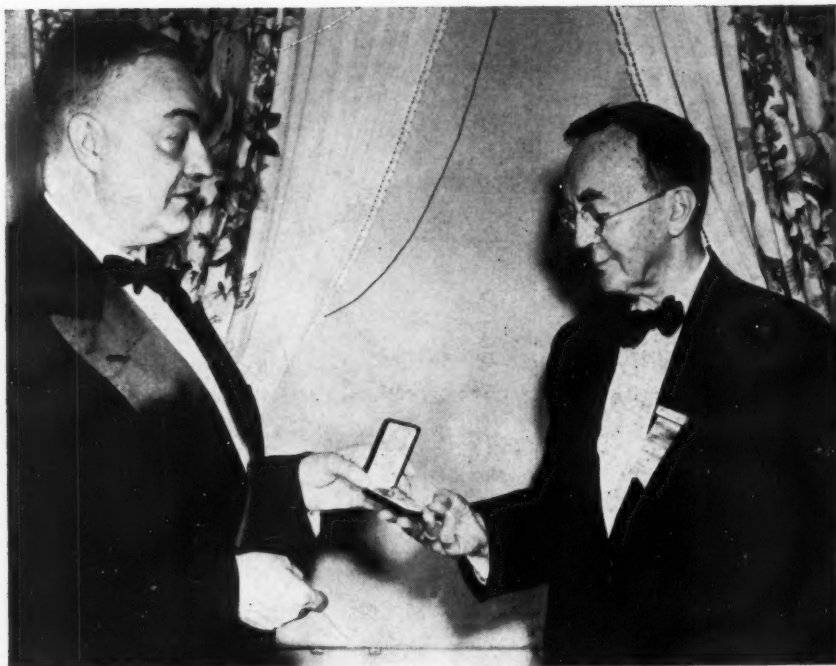
Polymeric components are weighed (above) and liquids added. Mixture is then poured into wide-mouth jars and rolled (top right) to disperse solids. Catalyst is then thoroughly mixed with resin, which is poured over assembly in mold (right).

## NBS Develops Casting Resin

Proper performance of electronic devices depends to a large extent upon protection of circuit components by potting them in a suitable casting resin. Scientists of the National Bureau of Standards have developed such a resin consisting of 2,5-dichlorostyrene and its polymer, styrene and its polymer, hydrogenated terphenyl, and a solution consisting of 60 per cent divinylbenzene. Weight percentages of these six components are 33, 21.5, 21, 11, 13, and 0.5 respectively. Catalyst for the polymerization is benzoyl peroxide. Wide use of the resin in radar, radio and other electronic equipment is foreseen.



The electronic circuit, potted with the resin, is placed in a curing oven (left) where polymerization occurs. Above is a control motor (right) and its two-stage amplifier (left) potted in the new resin.

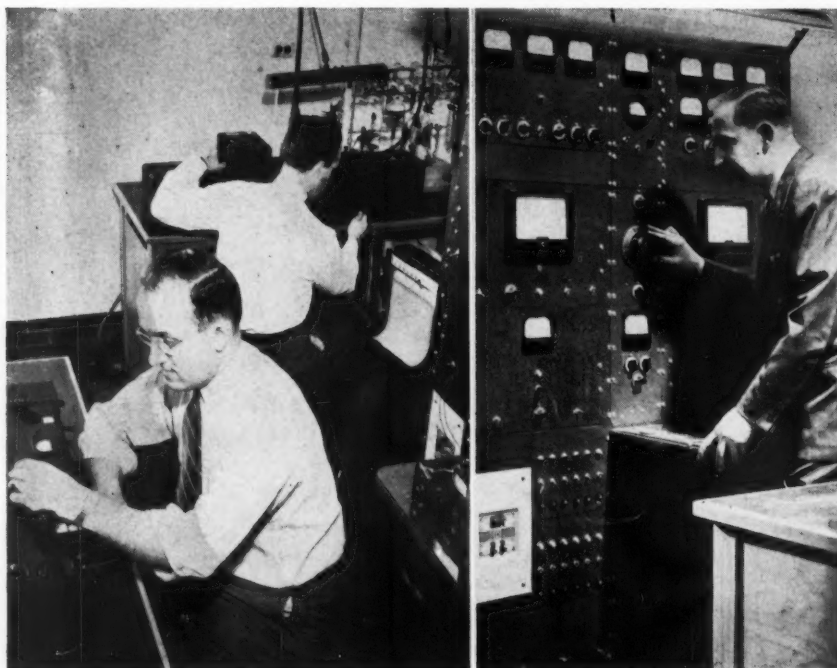


## AIC Honors Crossley For Research Accomplishments

Cited for "his scientific work, leadership in research, and activities in behalf of the profession," Moses L. Crossley, director of research, American Cyanamid Co., received the gold Medal of the American Institute of Chemists last month.

The medal was presented to Dr. Crossley by Foster D. Snell (left, above), president of the AIC. Henry M. Wriston (upper right) president of Dr. Crossley's alma mater, Brown University, spoke on "Crossley as I Know Him." The scientific accomplishments of the medallist were related by Arthur J. Hill (right), director of the Sterling Chemistry Laboratory, Yale University.

In his acceptance address Dr. Crossley emphasized the fact that without research the accomplishments of technology could never have been realized. He also outlined research advances which provided "the means for building the foundation of modern civilization"—including developments in chemotherapy, and the uncovering of the fundamentals of biological processes.



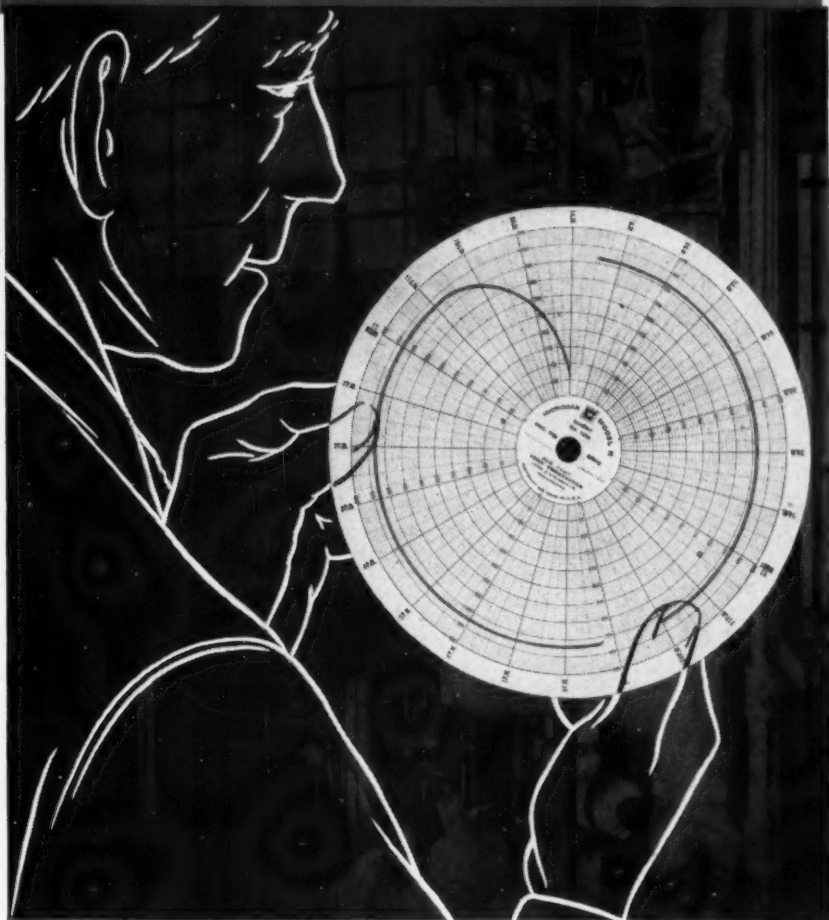
## Electronic Analysis

A useful assembly of electronic analytical equipment—including infra red, ultra violet and mass spectrometers—is now being used at the Lehigh University Institute of Research, Bethlehem, Pa. At present most of the research is being conducted for the Frankford Arsenal, particularly in connection with the analysis of volatile compounds formed during the oxidation of lubricating oils and greases.

At left, George Hartman measures transmissions by means of the ultra violet spectrometer. In the center, William Levine checks lubricating oil properties with the infra red spectrometer. Dr. Earl Serfass, at right, head of Lehigh's Analytical Chemistry Division, and designer of the assembly, "tunes in" mass 43 formed by the cracking of butane by the electron beam of the mass spectrometer's ion gun.

# Dowtherm

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In processing operations where temperature control is a vital problem—in the manufacture of plastic materials or the processing of certain food products for example—Dowtherm has more than proved its ability to provide the uniform, precisely controlled heat required. This is one of the many reasons which account for enthusiastic approval of Dowtherm installations by more than 600 users.

This dependable heat transfer medium, in addition to its outstanding advantage of accurate temperature control, incorporates other important features. Dowtherm operates at lower pressures resulting in saving of both man hours and material—temperatures ranging as high as 700° F. involve a corresponding pressure of only 88 lb./sq. in. And Dowtherm heating systems make possible greater operating efficiency and reduced maintenance costs.

For precise, low pressure heating in the 300°-725° F. range, investigate Dowtherm. Write to Dow for complete information.

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## CHEMICAL COMMENTS

### Dichloro (Phenyl Ether) Stops Attacks of Ambrosia Beetle in Green Lumber

Chemical control of Ambrosia (pin-hole) Beetles is offered by Dichloro (Phenyl Ether). Attacks by the beetles, which bore into green timber and freshly sawed lumber of many hardwoods, are stopped by the chemical, and prolonged protection is given. An oil solution or a water emulsion may be applied to the freshly cut lumber with any type of hand or mechanically operated pressure sprayer. Since Dichloro (Phenyl Ether) mixes readily with inexpensive light oils of the kerosene range, and presents no handling difficulties, treating solutions are easily prepared locally.

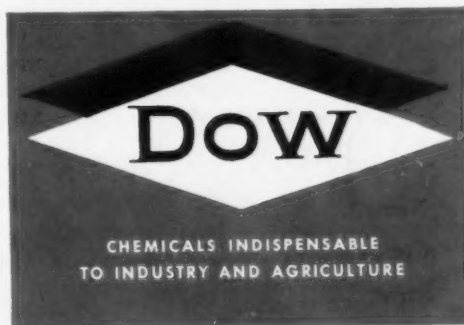
### Improved Ink Gloss Follows Sizing of Paper Surface with Methocel

Penetration of printing ink is minimized by a light coating of Methocel, and the gloss and brightness of inks or varnishes subsequently applied is noticeably improved. Applied as a surface sizing at the water boxes of the calender stack, Methocel deposits a film possessing a high degree of adherence to paper or paperboard. And, on waxing stock, a light prime coat of Methocel greatly reduces the penetration of paraffin, and maintains the opacity and whiteness of the original stock.

### Coating Fabrics for Chemical Resistance

Saran F-122 Latex, a new Dow material for the textile industry, is used as a coating, impregnating and laminating agent in the treatment of fabrics. Coated with Saran Latex, fabrics are particularly well-suited for industrial use where chemical and abrasion resistance and durability are important. They are made resistant to water, oils, greases, gasoline, and acids in the making of protective clothing, tarpaulins and other products. Yarn and thread can also be coated with Saran Latex, making them waterproof and resistant to picking and linting.

*50th Anniversary 1897-1947*



# NEW PRODUCTS & PROCESSES

## Detergent for Metal Finishing Industry

NP 502

A new solvent emulsion type detergent, Wyandotte Emlon, for use in the metal finishing industry, has been developed by Wyandotte Chemicals Corp. This product is a unique combination of organic solvents and emulsifiers and lends itself to the formation of unusually stable emulsions even in the presence of acids, alkalies and other electrolytes.

Experiments have shown this product to be exceptionally effective and economical in a wide variety of applications—in power spray washers, pre-soak and still tanks, for cleaning prior to phosphatization, and as an adjunct to acid or alkali cleaners. In addition to many other uses where an emulsifiable solvent is desired, Wyandotte Emlon is added to stamping and drawing compounds to facilitate their removal.

This detergent can be safely used on ferrous as well as non-ferrous surfaces. Its high-boiling and non-foaming characteristics provide longer cleaner life in addition to making it easy to use. Package sizes are 5 gal. and 15 gal. and 55 gal. drums.

## Improved Polystyrene

NP 503

A new and improved polystyrene, Lustrex, which will withstand scalding temperatures and actual boiling for short periods of time, and which has improved physical and molding properties, has been developed by Monsanto Chemical Co.

The new material is not a copolymer. It is in limited commercial production, but output will be expanded as rapidly as possible. Lustrex will cost about five

cents a pound more than standard polystyrene.

While the material has an ASTM heat distortion point of 190° F., it is reported that articles molded of this material have been boiled from ten to fifteen minutes without visible distortion. Additionally, the material has improved impact and flexural strength.

Lustrex has excellent moldability in standard injection and extrusion machines, in which no modifications nor alterations are necessary. In some instances, molding conditions are the same, but usually it has been found helpful to increase cylinder temperatures 25° to 60° F., and to increase ram pressures 100 to 200 pounds per square inch. Quick setting properties of the material usually make it possible to reduce molding cycles, in many cases 30 per cent. No impairment in appearance of the molded part is occasioned by such cycle reductions. The increased strength of the material (12,000/14,000 pounds per square inch flexural strength) makes it possible to mold articles from the material which formerly had to utilize cellulosic compounds.

The company forecasts that Lustrex will replace standard polystyrene in many applications and will be used in applications where standard polystyrene is not suitable. It is expected to find wide usage in such applications as kitchen utensils, household accessories, radio cabinets, surgical appliances, photographic equipment, musical instruments, drug sundries, and lamps.

The new material has an unlimited color range, but initially will be offered only in a group of standard colors.

## Vinyl to Vinyl Bonding

NP 504

Successful bonding of vinyl to vinyl through use of a specially formulated Resyn adhesive has been reported by the Resyn Department of National Adhesives.

Vinyl acetate, butyral, chloride and acetate-chloride sheetings, or other stocks coated with these materials can all be bonded with this adhesive.

Maximum strength of the bond is obtained after 48 hours. Nevertheless, the Resyn adhesive has sufficient tack so that bonded products can be handled with care two hours after bonding.

Use of the adhesive is indicated in the pocket-book and shoe trades where a good amount of synthetic patent leather is vinyl. Rainwear and luggage manufacturers also find many applications of the adhesive in processing coated stock and fabrics.

Known as Resyn Adhesive 2632, the specialty is a fluid, solvent type of adhesive, ready for use as supplied and suitable for hand application.

## Water-Repellent Coatings

From Silicon

NP 505

Alkoxy amino silanes, a new class of organic chemical compounds, are being used to give tough, water-repellent coatings, which resist temperatures as high as 250° F. and can be applied to a wide variety of material, including cloth, paper, glass and pottery.

When road aggregate or gravel used to reinforce asphalt is made water-repellent by treatment with one of the new compounds, it adheres better to the asphalt. Roads so constructed will have increased life and resistance to stripping.

Paints and varnishes are more resistant to water and are better electrical insulators when mixed with small amounts of one of these compounds.

Cellulose materials repel water when coated with amino silanes and have been found to adhere better to organic materials such as paraffine. Filter paper so treated allows organic liquids to pass while holding back water.

Ceramic articles may also be effectively treated without glossing or filling of pores, and powdered or fibrous materials are not cemented together by the new compounds.

Powders such as silica, silica gel, and other fillers and pigments may be coated without clotting to make them hydrophobic. Application of the liquid itself or its vapors is effective. Following application a heat cure at about 150° F. is used.

Di-tertiary-butoxy diamino silane is the only one of the new compounds now being produced commercially, but related compounds are under investigation and will be introduced as uses for them are found.

The amino groups attached to silicon give reactions characteristic of amides and may be readily hydrolyzed in the

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (6-7)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 502	NP 505	NP 508
NP 503	NP 506	NP 509
NP 504	NP 507	NP 510

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# CARBOWAX Compounds + water =



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**W**ATER solutions of "Carbowax" compounds serve as lubricants for household and industrial laundry products—as cream vehicles for pharmaceutical and cosmetic formulations—dispersants for aqueous paints and polishes—and as solvents for insecticides and dyestuffs.

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**Lubricant** for: starch sizing—plastic molding—calendering of paper and textile resin coatings—ceramic bodies—metal extrusion.

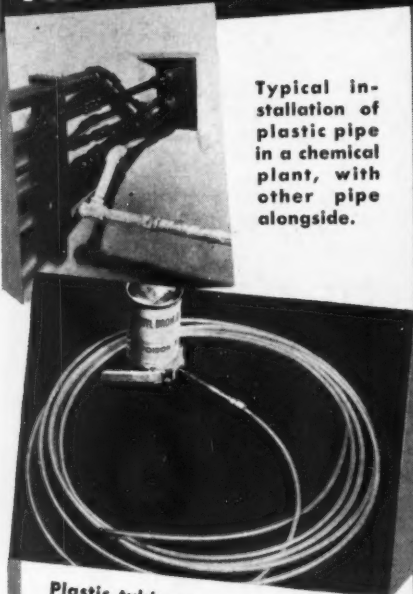
**Plasticizer and Softener** for: polyvinyl alcohol—water-soluble gums—rayon finishes.

**Dispersant** for: proteins—pigments—starch and oxidized starch.

Our product development group will be glad to assist you in working out formulations and applications for your product or process. A booklet—Form 4772—which includes suggested formulations and detailed information on the uses of "Carbowax" compounds is available on request. When writing for your copy, please address Department "D6."

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## New Products and Processes Index Volume 60, January-June, 1946

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		Water-repellency, Silicon coatings for	978
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the nation's industries

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**M**ANUFACTURERS of household sprays, insecticides and disinfectants rely heavily upon aromatics to make their products acceptable to the purchaser for home use. In fact, no manufacturer would risk marketing such a product without employing some effective means of masking the odor of its basic ingredients. This problem of spray manufacturers has recurred so frequently in our laboratories that it is now just a matter of simple routine to prescribe the perfume or deodorant best suited to the job at hand. But all odor problems are not so easily solved. Indeed, many are highly complex . . . which makes us wonder: Is there a complex odor problem to be solved in *your* business? If there is . . .

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presence of water to yield the corresponding hydroxy compounds. By hydrolysis and polymerization, water-white liquids and brittle resins may be obtained.

The amine groups will also react with hydroxy-containing compounds and with other amines. Since each of the two amino groups is capable of reaction, the material will act as a cross linker between molecules containing active hydroxyl or amino groups.

### New Acids for Electroplating

NP 506

A new series of chemicals, derivatives of alkanesulfonic acids of low molecular weight, may replace poisonous hydrocyanic acid and explosive perchloric acid in commercial electroplating. The new acids, which are neither poisonous nor explosive, are currently available from the Standard Oil Co. of Indiana, in exploratory quantities, and commercial production is contemplated for the near future.

Methanesulfonic, ethanesulfonic and propanesulfonic acids and mixtures of these three can now be made by a catalytic process from sulfur compounds obtained as a byproduct in the manufacture of gasoline. The byproduct oil is oxidized to make the finished acids.

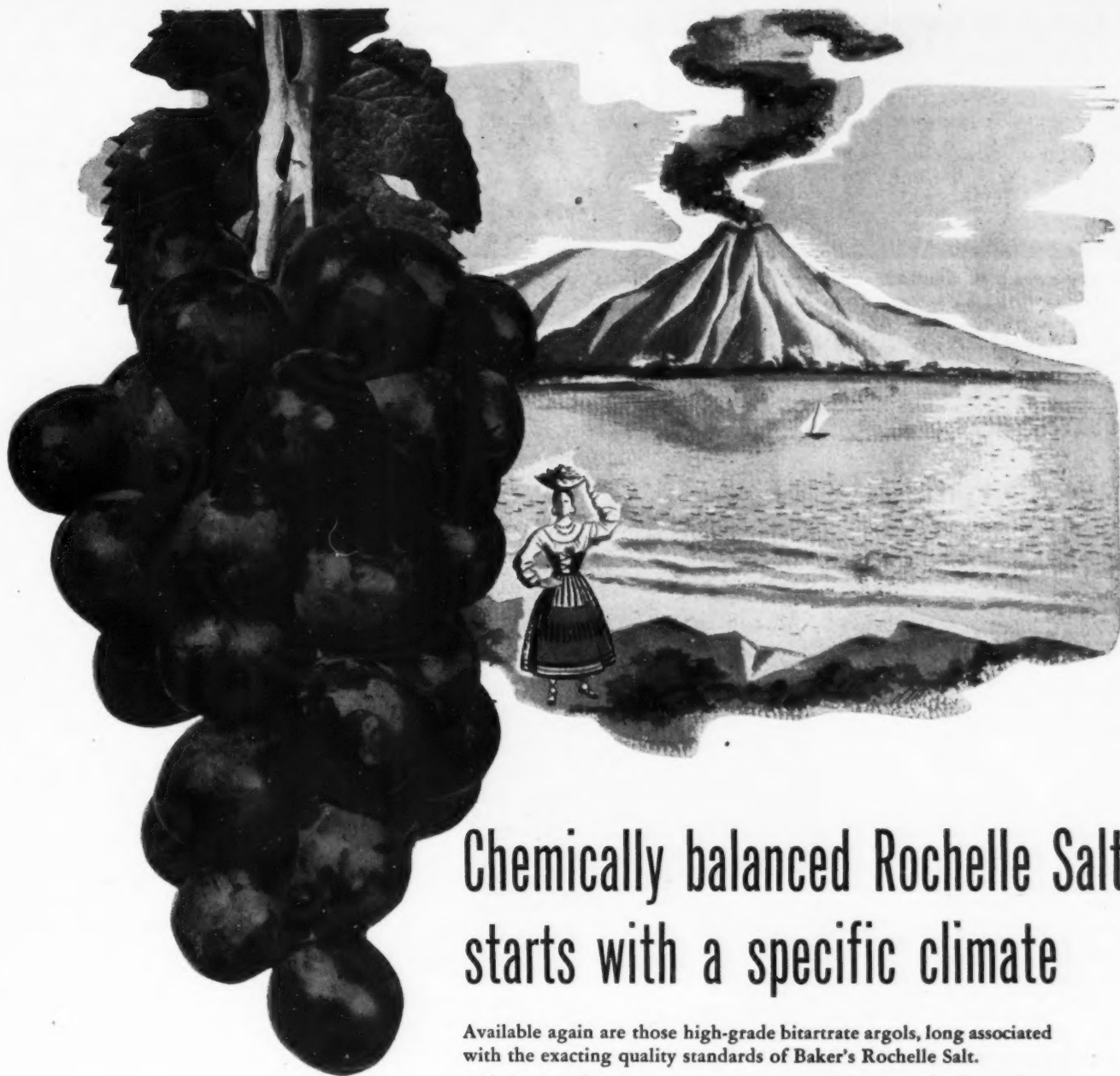
The salts of the alkanesulfonic acids are very water-soluble, a property which favors their use in electroplating. Research has shown that most of the common metals can be readily plated from solutions containing these salts. Copper can be plated at very high speeds—roughly ten times as fast as with the plating solutions now being used commercially. The metal surface thus obtained is of unusually high quality.

The new acids should also have other important uses. Unlike the usual organic acids, they are "strong" acids and in general behave much like the well-known mineral acids. They may be described as hybrids between these mineral acids and organic compounds, so that they are soluble in most common solvents, such as alcohol and ether. Solubility in hydrocarbons is lower but is appreciable, and enhances their use as catalysts in synthetic processes involving hydrocarbons. In such processes the non-oxidizing nature of the acids as compared with the usual mineral acid catalyst (sulfuric acid) reduces the tendency to discolor the product. The acids can be handled in either glass or stainless steel. They can be reacted with chemicals to form many interesting and valuable derivatives which are expected to find wide utility.

### Tetrahydropyran

NP 507

Tetrahydropyran, or pentamethylene oxide, is a powerful solvent for many natural and synthetic resins. Lacquers and plastics can be prepared by dissolving certain organic film-forming substances in tetrahydropyran. The liquids are col-



## Chemically balanced Rochelle Salt starts with a specific climate

Available again are those high-grade bitartrate argols, long associated with the exacting quality standards of Baker's Rochelle Salt.

Only in one European area is there a combination of soil, sunshine and growing weather that will produce grapes for bitartrate argols acceptable to Baker.

For chemically balanced Rochelle Salt starts with exacting raws made possible in a specific climate.

If you manufacture a drug or pharmaceutical product that requires neutrality or chemical balance of each component part of Rochelle Salt, you will be interested in Baker's current production of this material.

Baker's Rochelle Salt dissolves quickly in solution. There is freedom from insoluble matter and heavy metals to an unusual degree. There is chemical balance between the alkali metals, Potassium and Sodium, and Tartaric Acid.

Whether you order Baker's Rochelle Salt, U.S.P., in granular or powder form, you will appreciate its uniformity of chemical and physical characteristics. Samples and quotations gladly sent upon request.

J. T. Baker Chemical Co., Executive Offices and Plant: Phillipsburg, N. J. • Branch Offices: New York, Philadelphia, Boston and Chicago



# Baker's Chemicals

C. P. ANALYZED .. FINE .. INDUSTRIAL

# UTILIZATION OF ANSUL

# CH<sub>3</sub>Cl

These examples illustrate a few specific applications for Ansul Methyl Chloride in research laboratory and industrial practices:

**GRIGNARD** . . . . .  $\text{CH}_3\text{Cl} + \text{Mg} \rightarrow$

**QUATERNARIES** . . . . .  $\text{CH}_3\text{Cl} + \text{RNH}_2 \rightarrow$

**ALIPHATIC ETHERS** .  $\text{CH}_3\text{Cl} + \text{NaOR} \rightarrow$

**AROMATIC ETHERS** .  $\text{CH}_3\text{Cl} +$

**ALIPHATIC HYDROCARBONS** . . .  $\text{CH}_3\text{Cl} +$

**AROMATIC HYDROCARBONS** . . .  $\text{CH}_3\text{Cl} +$

" " . . .  $\text{CH}_3\text{Cl}$

**SILICONES** . . . . .  $\text{SiCl}_4 + 2\text{CH}_3\text{MgCl} \rightarrow (\text{CH}_3)_2\text{SiCl}_2 + 2\text{MgCl}_2$

In addition Ansul Liquid Methyl Chloride is being currently used as a low temperature solvent • propellant solvent • extractant • refrigerant • and in other laboratory and industrial processes.

Methyl Chloride is a low priced chemical available in tank cars and large and small cylinders.

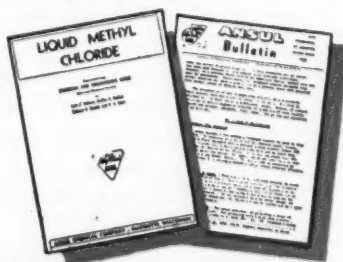


## PHYSICAL PROPERTIES

Chemical formula . . . . .  $\text{CH}_3\text{Cl}$   
Molecular weight . . . . . 50.491  
Color (gas or liquid) . . . . . Colorless  
Odor . . . . . Ethereal, non-irritating  
Melting point . . . . .  $-144^\circ \text{F. } (-97.6^\circ \text{C.})$   
Boiling point . . . . .  $-10.65^\circ \text{F. } (-23.7^\circ \text{C.})$   
Critical Temperature . . . . .  $289.6^\circ \text{F. } (143.1^\circ \text{C.})$   
Critical pressure . . . . . 969.2 lbs. per sq. in. abs.  
Solubility . . . . . Methyl chloride in water—3 to 4 volumes methyl chloride vapor in 1 volume of water at ordinary temperatures and atmospheric pressure—methyl chloride in alcohol—readily soluble.  
Specific gravity of liquid . . . . . .909

\*REG. U. S. PAT. OFF.

Consult Ansul's research and technical departments on these and other applications of Methyl Chloride.



Write for treatise on Ansul Liquid Methyl Chloride and request bulletin describing the specific laboratory and industrial application in which you are interested.

For your SULFUR DIOXIDE applications . . . . Use **ANSUL SULFUR DIOXIDE**

**ANSUL CHEMICAL COMPANY**  
INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WIS.  
60 E. 42nd St., New York — 535 Chestnut St., Philadelphia

orless. Modifiers, dyes, pigments, and plasticizers may be added as desired.

A colorless, mobile liquid with ether-like odor, tetrahydropyran has a molecular weight of 86.13, boiling point,  $88^\circ \text{C.}$  at 760 mm, and specific gravity, 0.8814. It is miscible with water, but less soluble in hot than cold water, and immiscible with water at  $100^\circ \text{C.}$  It is miscible with alcohol, ether, and most of the common organic solvents.

Tetrahydropyran is a cyclic ether, similar to tetrahydrofuran in physical properties and reactions. Chlorination yields mono-, di-, tri-, and tetrachlorotetrahydropyrans. Tetrahydropyran reacts with acid chlorides to form omega-halamyl esters. Conversion to dihalides such as 1,5-dibromopentane and 1,5-dichloropentane can be effected. Many mono- and di-substituted derivatives of pentane can be obtained from the dihalide. Tetrahydropyran reacts with ammonia and aliphatic and aromatic amines to form piperidine and substituted piperidines.

It is a solvent for rosin, ester gum, Manila copal, shellac, ethyl cellulose, cellulose acetate, polyvinyl chloride, vinyl chloride copolymers, chlorinated polyvinyl chloride, vinylidene chloride copolymers, alcohol-soluble phenolic resins, polystyrene, and chlorinated rubber. Tetrahydropyran is available at present on limited quantities for research and development purposes from the Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc.

## Ethylhexanediol

NP 508

2-Ethylhexanediol-1,3, a high-boiling, non-volatile glycol, is now being produced in commercial quantities for general use by Carbide and Carbon Chemicals Corp. The first glycol of limited water solubility to be produced on an industrial scale, it is of interest as a raw material for chemical manufacture and as a new ingredient for cosmetics. This compound was first manufactured during the war for use as an insect repellent and is well known as a civilian product under such brand names as "6-12." It has proved to be a highly effective, long lasting, pleasant-to-apply repellent, with a perfect toxicological safety record. Despite its use by millions of men and women there has not been one single reported case of skin irritation or dermatitis.

This glycol has a viscosity between those of ethylene glycol and glycerol, but it differs from these polyalcohols in its very limited solubility in water. Containing eight carbon atoms, ethylhexanediol is compatible with hydrocarbon-like substances while still retaining the excellent solvent properties of the dihydric alcohols.

The commercial material has a faint odor, similar to that of witch hazel. Because ethylhexanediol combines the properties of a mild readily perfumed odor,

# HERCULES TOXICANTS

for sprays and powders

## THANITE\* . . .



a 100% active toxicant, 82% isobornyl thiocyanacetate, and 18% other active terpenes. Contains no diluents.

## THANITE + DDT CONCENTRATE . . .



a liquid mixture containing 75% Thanite, and 25% DDT by weight. Combines merits of Thanite and DDT.

## THANASOL\* . . .



a water-miscible form of Thanite containing 70% Thanite by weight. Forms an emulsion when added to water.

## THANASOL + DDT CONCENTRATE . . .



a liquid mixture containing 97% Thanasol (67.9% Thanite) and 3% DDT by weight.

## DDT (Aerosol Grade) . . .



contains 93 to 99% para-para isomer, and has a setting point of at least 103°C.

## WATER-MISCIBLE DDT CONCENTRATE . . .



a water-dispersible toxicant containing 25% DDT by weight. Answers the demand for a residual type DDT water spray.

## OIL-SOLUBLE DDT CONCENTRATE . . .



contains 25% DDT by weight. This toxicant is soluble in all proportions in base oils.

## 5-25 CONCENTRATE . . .



contains 25% DDT and 5.5% Thanite by weight. This toxicant is soluble in all proportions in base oils.



Write for 40-page book, "The Thanite Family." It contains useful information on the action of these Hercules insecticide concentrates against many common household pests.

\*Reg. U. S. Pat. Off. by Hercules Powder Company

## HERCULES POWDER COMPANY

992 Market Street, Wilmington 99, Del.

Please send copy of "The Thanite Family".

Name \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_ State \_\_\_\_\_

HT7-6

# Reilly Refined Coal Tar Chemicals

● Listed here are a few of the refined chemicals from coal tar that are now commercially available through Reilly research and development. Most of the products listed have not before been offered in quantity. Many of them have promise of usefulness to industry and to the nation.

These products, all of which are available in 90% or higher purity, have a wide range of applications, including: Pharmaceuticals, insecticides, fungicides, antiseptics, rubber chemicals, additives to gasoline and lubricants, photographic compounds, dyestuffs, plastics, printing inks, and in the synthesis of organic chemicals.

Further information on any of these products gladly furnished on request.

## Hydrocarbons

ACENAPHTHENE  
ANTHRACENE  
CHRYSENE  
DIMETHYLNAPHTHALENES  
FLUORANTHENE  
FLUORENE  
METHYLNAPHTHALENES  
2-METHYLNAPHTHALENE  
NAPHTHALENE  
PHENANTHRENE  
PYRENE

## Bases

2-AMINO-3-METHYLPYRIDINE  
2-AMINO-4-METHYLPYRIDINE  
2-AMINO-5-METHYLPYRIDINE  
2-AMINO-6-METHYLPYRIDINE  
2-AMINOPYRIDINE  
2-AMYL PYRIDINE  
4-AMYL PYRIDINE  
2-ETHANOLPYRIDINE  
4-ETHANOLPYRIDINE  
2-HEXYLPYRIDINE  
ISOQUINOLINE  
LEPIDINE  
2,6-LUTIDINE  
3-METHYLISOQUINOLINE  
2-(5-NONYL)PYRIDINE  
4-(5-NONYL)PYRIDINE  
ALPHA PICOLINE  
BETA PICOLINE  
GAMMA PICOLINE  
2-PROPANOLPYRIDINE  
4-PROPANOLPYRIDINE  
PYRIDINE  
QUINALDINE  
QUINOLINE  
2-VINYLPYRIDINE

## Acids

M-CRESOL  
O-CRESOL  
P-CRESOL  
M-ETHYLPHENOL  
P-ETHYLPHENOL  
1,3,5-METHYLETHYLPHENOL  
PHENOL  
1,2,4-XYLENOL  
1,3,4-XYLENOL  
1,3,5-XYLENOL  
1,4,2-XYLENOL

Send for 56 page booklet (second edition) and supplementary printing describing the complete Reilly line of coal tar chemicals, acids, oils, bases and intermediates.

## Reilly Tar & Chemical Corporation

Merchants Bank Building • Indianapolis 4, Indiana  
500 Fifth Ave., N. Y. 18 • 2513 S. Damen Ave., Chicago 8, Ill.

a low volatility, a ready compatibility with the customary ingredients of cosmetic lotions and creams, and freedom from any skin irritation hazards, it is finding use as a new ingredient for cosmetic preparations, especially where insect repellency is an added feature.

Ethylhexanediol may be used in the preparation of new types of emulsifying agents and perfume fixatives. Both its hydroxyl groups can be esterified, although the secondary group is less reactive. Under strenuous conditions, it will dehydrate to the unsaturated compound 2-ethylhexene-2-ol-1.

## Garlic Antibiotic Now Synthesized

NP 509

Synthesis of the active antibiotic principle discovered in common garlic has been achieved at the Sterling-Winthrop Research Institute, Rensselaer, N. Y. The resulting series of new synthetic compounds, called alkyl thiosulfinates, may be modified in structure in such a manner as to produce desired increase in activity against certain micro-organisms not now controlled by the sulfanilamides or penicillin. Increased activity, for instance, was noted against micro-organisms producing athlete's foot, ringworm, and a variety of other infections.

Alkyl thiosulfinates are much more stable than the natural garlic antibiotics and in several instances are also more powerful. The interesting feature in these compounds is that they illustrate a new key chemical structure which, when included in a large number of types of chemical compounds, imparts to them fundamental antimicrobial activity. How valuable they may be from a practical standpoint depends upon results of further biological testing.

The institute first isolated the active antibiotic substance in garlic and elucidated its chemical structure in 1944. Several properties of the natural product were unsatisfactory, notably the very low stability of the material. Besides the naturally occurring antibiotic, several other new compounds have been synthesized and all have been found to be active in preventing growth of bacterial and killing molds.

## High Styrene Rubber Resin

NP 510

Darex Copolymer X-34 is a new high styrene rubber resin which is valuable for compounding natural and synthetic rubbers. A hard, tough material which imparts these qualities to its compounds, its outstanding properties include low specific gravity, light color, complete compatibility with a range of other hydrocarbons, and resistance to aging, chemicals and oils. This combination of properties is economically employed in leather-like soles, heels and toplifts; durable, light-colored flooring; molded



# CELANESE ANNOUNCES METHYL ETHYL KETONE

In line with growing demands and short supply, commercial production of Methyl Ethyl Ketone has now been established at the Celanese Texas plant. This well-known solvent, widely used in the plastics and lacquer industries, is now being produced in tank car quantities to meet industrial requirements.

In addition to its outstanding solvent power, Methyl Ethyl Ketone possesses a higher boiling point and lower vapor pressure than acetone. Its unusual properties make it ideal as an intermediate in the manufacture of organic chemicals and dyes. It is a colorless liquid, soluble in water, alcohol and ether and miscible with oils.

Your Celanese chemical representative will be glad to supply samples and any specific data about Methyl Ethyl Ketone. Celanese Chemical Corporation, a division of Celanese Corporation of America, 180 Madison Avenue, New York 16, N.Y.

## METHYLAL

This Celanese Chemical is now available in quantities to permit large scale experimentation. A high power, low boiling solvent, methylal is stable in the presence of alkalis...valuable as a vaporizing, extraction or reaction solvent.

	PHYSICAL PROPERTIES	TENTATIVE SPECIFICATIONS
METHYLAL CONTENT	100%	95% Min.
COLOR	Water White	Water White
SPECIFIC GRAVITY		
	$\frac{20^\circ\text{C.}}{4}$ 0.8601	0.8600—0.8630
FLASH POINT,		
OPEN CUP, approx.	0° F.	0° F.
BOILING POINT	42.3° C.	41.5°—43.5° C.
REFRACTIVE INDEX,		
$\frac{20^\circ\text{C.}}{D}$	1.3534	1.3530—1.3550

Write for sample and New Product Bulletin N-08-1.



ALCOHOLS • ALDEHYDES • ACIDS • SOLVENTS • INTERMEDIATES • PLASTICIZERS • KETONES

•Reg. U.S. Pat. & M.



# Filter Twills & Filtration Cloths

Our filtration products are distributed and serviced by selected specialists in the filtration field.

The benefit of their expert advice is available to users of filtration products to help them solve their many problems.

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mechanical goods; and other products requiring excellent abrasion resistance, superior tear resistance, high hardness, stiffness, and tensile strength.

Darex Copolymer X-34 is a special Buna S-type rubber resin having an unusually high styrene content. Chemically, it has a higher degree of saturation than ordinary rubbers, but it can be vulcanized alone and is, of course, readily vulcanized in compounds. Because it is less reactive with oxygen and chemicals, it has excellent resistance to deterioration of physical properties upon aging, and exposure.

Made by emulsion polymerization under closely controlled conditions, Darex Copolymer X-34 latex is stabilized with 2% Stalite antioxidant and is alum coagulated to give fine granules of uniform size. After careful washing and drying, it is packaged as clean, dustless, free-flowing granules in paper bags containing fifty pounds net. Manufacturing and shipping specifications include tests for color, plasticity, moisture content and ash. A special process makes it odorless and tasteless.

Darex Copolymer X-34 is distinguished by its low specific gravity, light color, great hardness and stiffness, and its ability to impart these qualities to natural and synthetic rubbers. Because it is very compatible with these materials, it actually reinforces them and increases toughness, tensile strength and hardness, where inorganic pigments and ordinary resins merely increase hardness.

## Interesting Patents

CONTINUOUS MANUFACTURE OF PHENOL from crude benzol wherein crude benzol vapor and oxygen-containing gas is passed under pressure through heated reaction zone void of solid catalyst to convert part of benzene in crude benzol to phenol and other oxidation products, and unreacted benzene is separated from phenol and oxidation products. No. 2,415,101. Robert Krieble and William Denton to Sicony-Vacuum Oil Co. Inc.

SUBSTITUTED 5-AMINO-1, 3-DIOXANES. No. 2,415,021. Glen Morey to Commercial Solvents Corp.

PRODUCTION OF THIOPHENE comprises heating to within 300 to 500°C. material selected from alkyl sulfides and alkyl mercaptans together with sulfur. No. 2,414,631. James Boyd, Jr. and Cary Wagner to Phillips Petroleum Co.

PRODUCTION OF REACTION PRODUCTS OF HALOGENATED BUTENES having three fluorine atoms attached to each primary carbon atom and fluorine or chlorine attached to each secondary carbon atoms, with potassium permanganate and caustic alkali, in aqueous solution. No. 2,414,706. Jesse Babcock and Alexander Kischitz to Hooker Electrochemical Co.

# BAKER

## *Plasticizers*



chemistry +



industry =



**DRAPE\***

\*To impart drape, "hand", flexibility to your unsupported films and coated fabrics, Baker Plasticizers are unusually effective.

Our Technical Service Department is always available to help you with your plasticizer problems.

*The* **BAKER CASTOR OIL COMPANY** *Established 1857*

120 Broadway, New York, N. Y.

Chicago, Illinois

Los Angeles, California

# NEW EQUIPMENT

## Conveyor Belt

QB 243

A new conveyor belt—250 to 400 per cent stronger—has been developed by United States Rubber Co. for conveying coal and other bulky materials over long distances.

It utilizes a new textile construction of nylon and Ustex yarn that increases the permissible working tension of each ply two and one-half times and permits the use of more plies.

## Silica—Removal from Boiler Water

QB 244

This new silica removal unit of Liquid Conditioning Corp. employs a standard demineralizing plant, consisting of a hydrogen zeolite unit followed by an anion exchange unit. To effect the elimination of silica, a fluoride, such as sodium fluoride, is added to the raw water entering the hydrogen zeolite unit. Here, the fluoride is converted into hydrofluoric acid by a resin type of acid-regenerated cation exchange material known as Liqueonex CR. The hydrofluoric acid combines with the silica to form fluosilicic acid while, at the same time, the Liqueonex CR converts the raw water hardness into the acids corresponding to the salts present.

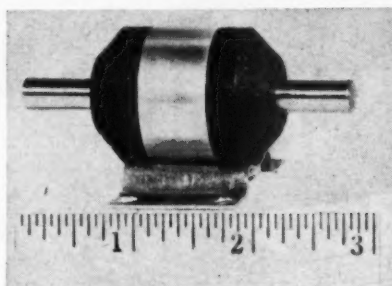
In the second stage Liqueon anion exchange unit, the fluosilicic acid together with the acids formed from the hardness

in the raw water are removed by Liqueonex A, an alkali-regenerated anion exchange resin of high capacity. A modification of this process removes the silica without the addition of fluorides, by means of a special anion exchanger following the standard demineralizing equipment.

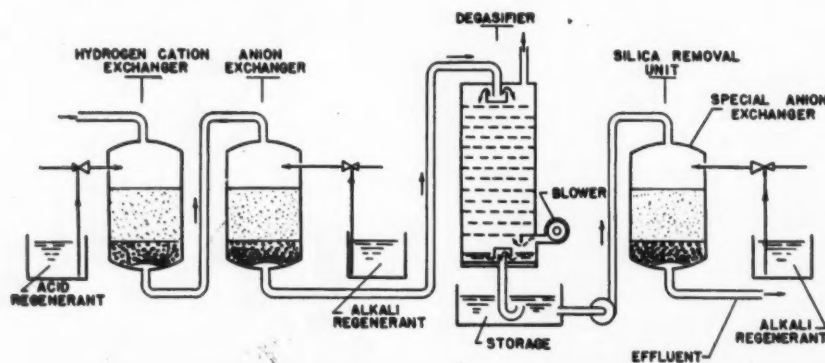
## Speed Changers

QB 245

Small speed changers are now available for instruments, controls, experimental work, etc., wherever it is desired to increase or decrease the speed of small



power devices. With an overall length of  $2\frac{1}{16}$ " and a body diameter of  $1\frac{1}{16}$ " they are extremely useful where limited power transmission in a small space is important. They are available in gear ratios of 15, 10, 9, 8, 7, 6, 5, 4, 3, 2,  $3/2$ ,  $4/3$ ,  $5/4$ ,  $6/5$ , or  $10/9$  and power may be transmitted in either direction.



## CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (6-7)  
Please send me more detailed information on the following new equipment:

QB 243	QB 245	QB 247	QB 250	QB 253
QB 244	QB 246	QB 248	QB 251	QB 254
		QB 249	QB 252	QB 255

(Please print)

Name .....

Company .....

Street .....

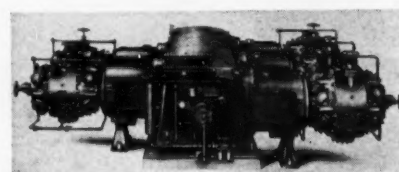
City & State .....

The Metron miniature speed changers of the Metron Instrument Co. handle speeds as high as 20,000 RPM and torques as much as 2 pound-inches. Spur gear construction is used and all gears are hardened for long life. The two drive shafts are concentric and are mounted in permanently lubricated ball bearings.

## Compressor

QB 246

The new motor-driven compressor (Type JM) of the Cooper-Bessemer Corp. is available in six sizes and with a great variety of compressor cylinders.



It is built with from one to six crank throws and ranges in horsepower from 500 to 2750. The compressor stroke is 14 inches and it operates at a speed of 300 revolutions per minute. Power for driving it can be taken from a standard synchronous electric motor, an engine, or a turbine. All cast parts are of Meehanite.

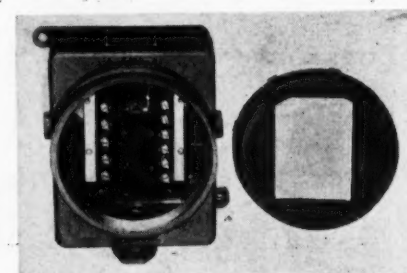
The compressor cylinders for the new unit are the same as those used on the Type GMV. Provision can be made for pressures from low vacuums to high pressures.

Dimensions of the Type JM compressor range from 11'7" to 24'6" in length, and from 13'9" to 24'2½" in width. These lengths may vary slightly depending upon the size motor used, while the widths may vary according to the type of compressor cylinder used.

## Level Control

QB 247

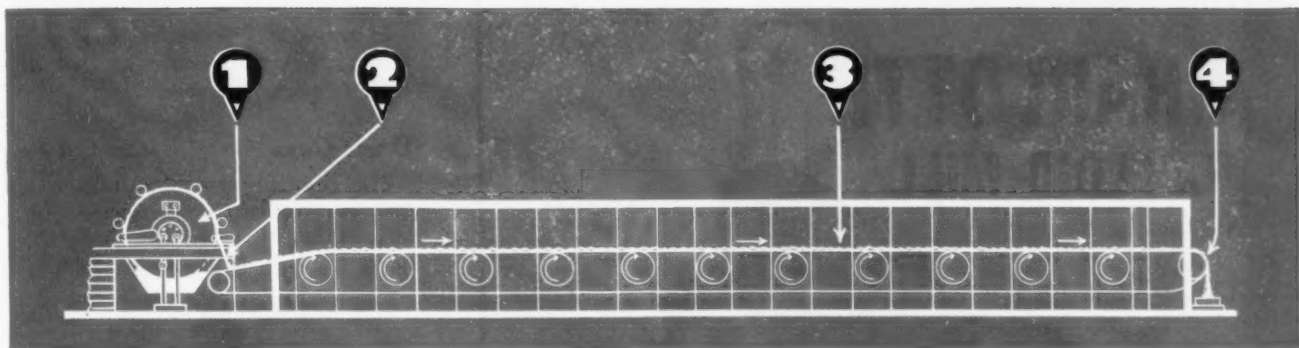
Photoswitch Inc. announces the availability of a new Level Control, Type 10CB1X. It has been designed for gen-



eral application. Contact with the liquid is made only by stainless steel probe rods—no floats or other moving parts are required in the tank. No vacuum tubes are used and accuracy is independent of temperature and pressure.

Level control, Type 10CB1X, is an AC control that combines a probe circuit and transformer to operate a direct current relay, insuring heavy contact pressures and long relay life. Two probe rods wired to the control project into the

# Nitro-guanadine uniformly dried at rate of 1,880 pounds per hour with



## the PROCTOR CONTINUOUS CONVEYOR SYSTEM

To meet output requirements and still maintain uniformity in the finished product, nitro-guanadine is dried in a specially designed Proctor continuous conveyor system. Here is what takes place: ① Nitro-guanadine is mechanically dewatered by means of a continuous rotary filter. While still on the drum of the filter, the material is scored, so that it will break into small pieces of uniform width and thickness as it is discharged to the conveyor of the dryer. ② With a moisture content of 67% (B.D.W.B.\*), the nitro-guanadine is then discharged to the conveyor of the dryer. At this stage it is in the form of small blocks about  $\frac{1}{2}$ " square in thickness and  $1\frac{1}{2}$ " to 2" in length. ③ Loaded to a uniform depth on the moving conveyor, the preformed nitro-guanadine is conveyed through the drying chambers, where heated air is circulated *through* the bed of material. Temperatures in the drying chambers are graded upward, from 240° F. at the beginning of the cycle to 270° F. at the end. Having been preformed into uniform shapes, more rapid diffusion is possible,

which accounts for the rapid drying and uniformity of the finished product. ④ After 67 minutes of drying time, the nitro-guanadine is discharged from the dryer at the rate of 1,880 pounds per hour (C.D.W.†), with a uniform moisture content of 0.25% (B.D.W.B.). By means of preforming the material and then drying it in the continuous conveyor dryer, it is possible for the manufacturer to secure a maximum output and still maintain uniformity.

Similar Proctor continuous conveyor drying systems, with preforming feeds designed for individual product requirements, are in operation for a wide variety of wet-solids. Since there are hardly two wet-solid drying problems exactly alike, it pays to consult Proctor engineers when you are considering drying equipment. On the basis of their experience in this field of drying, they will be able to make laboratory tests on your product and then translate the results into a recommended design that will meet your requirements.

\* Bone Dry Weight Basis  
† Commercial Dry Weight

**This is a case history taken from this new Proctor booklet**

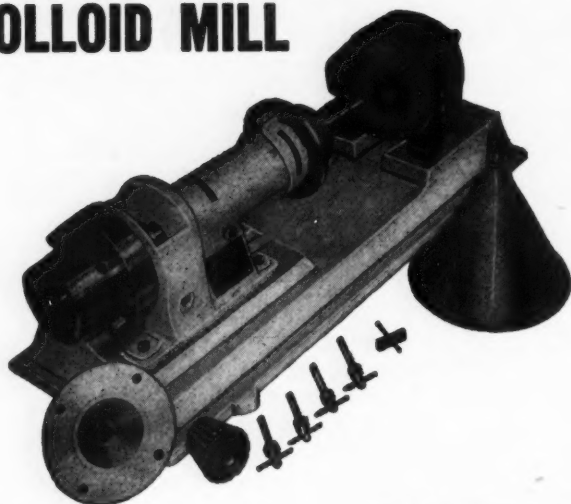
A new 12-page booklet on "Proctor Continuous Drying for the Chemical Process Industries" is available upon request. It contains many case studies showing the application for Proctor individually designed systems. Write for your copy of this informative booklet today.



**PROCTOR & SCHWARTZ, INC. • Philadelphia 20, Pa.**

The **SOLUTION** to many difficult Problems in Research and Plant Laboratories Has Resulted from the Application of the New

## CHARLOTTE COLLOID MILL



MODEL N.D. 1

OPEN FOR INSPECTION

**A Sturdy, Compact Machine for Laboratory and Small Commercial Operation.**

**Patterned After the Larger Models, It Is Precision Built for Constant Operation, and Is Sturdy and Rugged in Construction. Readily Cleaned and Sterilized.**

The Charlotte Colloid Mill is well known in the *Chemical, Pharmaceutical, Cosmetic, Food* and other fields, where it is daily proving its value to these and other industries.

Wherein *Emulsion, Homogenization, Disintegration* or *Thorough Blending* are necessary and desirable, there is no machine that can accomplish more, and still give *continuous production* with consequent saving in production costs and floor space.

For a Thoroughly Blended, Homogeneous Product, with a finer texture, use the CHARLOTTE. We know that you will be well satisfied with its performance as have so many others.

The Charlotte Colloid Mill is manufactured in sizes ranging from 1 h.p. to 75 h.p.

Send for descriptive catalog.

### CHEMICOLLOID LABORATORIES, Inc.

44 WHITEHALL STREET  
NEW YORK 4, NEW YORK

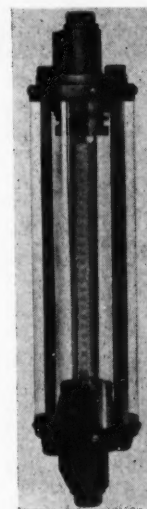
tank to the levels corresponding to the low point where pumping is to start, and the high point at which pumping stops. When the level of liquid falls below the lower probe, the level control closes the electrical circuit controlling the pump or valve. When the liquid rises to the level of the upper probe, the fluid acts as conductor of the minute current at low voltage required for the operation of the relay. Opening of the electrical circuit results, and pumping operations stop.

It is supplied in an explosion-proof housing, or more generally in a pressed steel, dust-tight enclosure.

#### Draft Gage

QB 248

The new, all-purpose draft gage of Bacharach Industrial Instrument Co., Model MZF, is supplied with 9' of rubber tubing and a 5" metal sampling tube. It



can be used for readings at the point of draft measurement, or placed any distance away from the test point.

Among the design features are exceptionally large area diaphragm enclosed in a metal housing, a distinctive 3"-wide scale which can be read accurately and easily even in dim light; zero adjustment can be made without removing any parts. Its dimensions are 4¾" wide x 7½" high x 3" deep.

#### Deaerator

QB 249

Liquid Conditioning Corp. has developed the Liquon vacuum deaerator for removal of dissolved gases from cold water. The unit consists of a chamber in which the water is broken up into thin sprays and films to permit ready release of the dissolved gases, and a steam ejector or vacuum pump to maintain the necessary vacuum.

Where steam is available, the required vacuum is created by a two stage ejector with an inter-condenser between. The condenser is provided to reduce the amount of gas to be handled by the second stage of the ejector, thus saving steam. Motor-driven vacuum pumps are used where steam is not available.

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**SPECIALTIES**

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**DIBUTYL TARTRATE**

**BUTYL STEARATE**

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**BUTYL "CELLOSOLVE"\* STEARATE**

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**STEARATES**

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**Textile, Cosmetic, Pharmaceutical  
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**KESSLER CHEMICAL CO., INC.**

ESTABLISHED 1921

**STATE ROAD and COTTMAN AVE. • PHILADELPHIA 35, PA.**

## Hard Working PROTECTION



**Hodgman Industrial Aprons  
for Safety and Efficiency  
in the Chemical Industries**



No. 7100

Hodgman Protective Clothing is ruggedly constructed, to provide maximum protection, comfort and long wear. Fabrics are coated in our own plant to make individual garments highly resistant to water, mud, acids, caustics, abrasives, greases, oils and other harmful agents.

No. 7071 is a black apron for general industrial use. No. 7160 is of same design and color but is especially made to resist fats, oils, greases and most solvents.

No. 7100 (above) is a strong black industrial apron which resists dilute acids and abrasion. Made of sheeting with both sides coated with synthetic rubber.

No. 7075 is a white apron for use in dairy, canning, packing and similar industries. No. 7096 is same as No. 7075 but especially treated to withstand greases and oils.



No. 7075

Send for complete information regarding these and other Hodgman Industrial Aprons.

**HODGMAN**  
*Rubber Company*  
FRAMINGHAM, MASS.

## Water Demineralizer QB 250

A new "Filt-R-Stil" water demineralizer has been developed by the Ion Exchange Products Department of American Cyanamid Co. Known as the Model U-60, it operates at a flow rate of 60 gals.



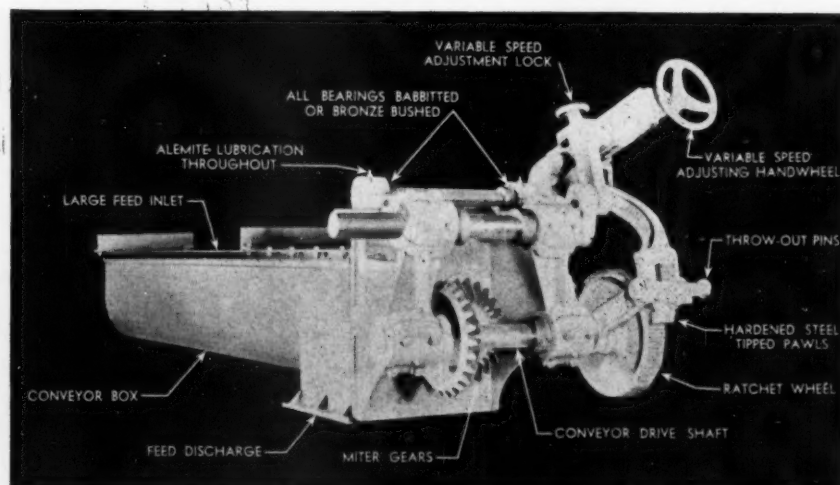
per hr. By utilizing the change in resistance of the deionized water with ion content, the attached controller can be adjusted to deliver water with a maximum solids content varying from 10 ppm. to 1 ppm.

Four columns containing alternate beds of cation and anion exchange resins are used. In operation water is passed through the four columns in series, alternately removing the cations and anions from the solution. The "Ionac" resins used will also remove the carbon dioxide content of the water.

## Feeder Drive QB 251

This feeder drive will handle the extra load and high capacities required by most wide mouth feed bins, according to the Sprout-Waldron Co.

Wide babbitted and bronze bushed bearings seat large diameter drive shafts in this self-contained unit. A speed adjusting mechanism provides an even, continuous rate of discharge. The drive bolts



directly to the conveyor box end and requires no intermediate coupling.

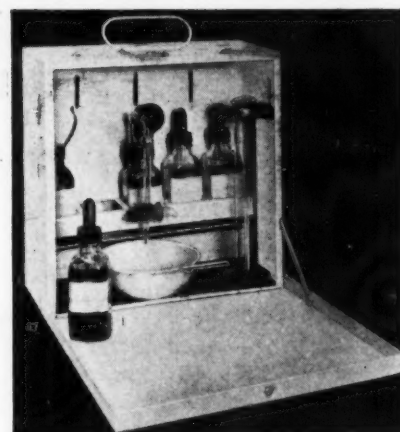
## Carry-Over Test Kit

QB 252

The metal cabinet of the new testing unit of Trutest Laboratories, Inc., contains all apparatus and standardized chemicals for chloride determinations and constant carry-over control for high pressure boilers.

For a determination a 100 ml. sample of the water to be tested is poured into the casserole. Phenolphthalein indicator is then added to the sample. If the sample turns pink (indicating alkalinity), 5% sulfuric acid is added until the pink color disappears. Then ten drops of potassium chromate indicator are added.

Now N/25 silver nitrate is slowly added from the specially designed automatic micro-burette until a slight orange red



color develops throughout the sample. This is the end point. Results are read directly from the burette in grains per gallon.

## Vapor Proof Rotameter QB 253

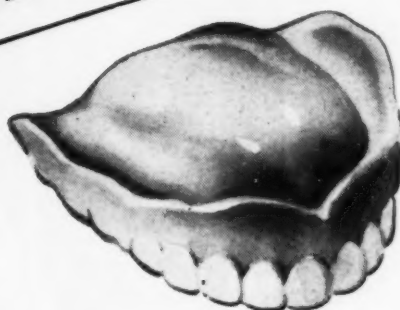
This new vapor-proof rotameter of Schutte & Koerting Co., has a clear plastic tube which encloses the entire metering tube assembly. This overall covering prevents damage to the pyrex tube, or packing glands and bolts where the atmosphere is corrosive in character and also



**DENIMS**

*and*

**DENTURES**



Textile printing pastes and dental impression compounds might seem to have nothing in common—yet Kelco Algins are common to both. —And the versatility of Kelco Algins doesn't stop there! Ice cream, boiler feed water compounds, shaving cream, cold water paints, chocolate milk drinks, paper board containers, pies, cakes and sulpha drug ointments—these are just a few of the widely-diversified products that find Kelco Algins superior stabilizing agents.

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Kelco Algins are products of nature, rigidly processed to produce consistently uniform results. They are an extremely economical answer to your stabilizing problem. Our technical department will assist you in adapting Kelco Algins to your specific application. Drop us a line today.



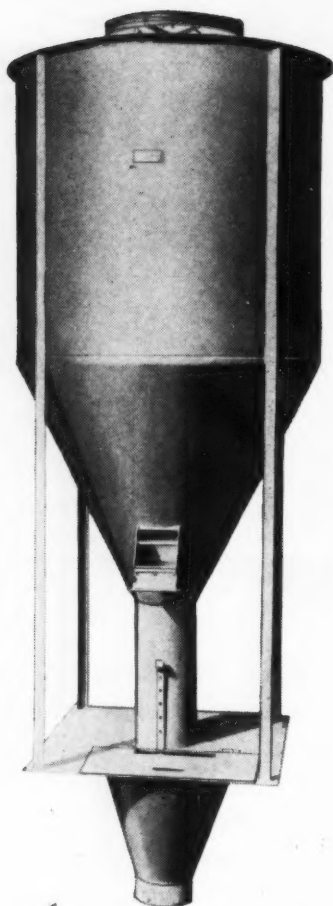
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NEW YORK-5

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## THE STYLE V MIXER

### AMERICA'S OUTSTANDING MIXING UNIT

Expertly designed and ruggedly constructed, the Sprout-Waldron Style V Mixer is a highly efficient mixing unit. Added to the Sprout-Waldron line of horizontal mixers, continuous mixers, and L. M. S. type vertical mixers, the Style V completes an outstanding line that includes the size and style mixer best suited to your needs.

With but one moving part—the vertical shaft of the mixing conveyor—maintenance and replacement costs in the Style V are negligible.

The design of this mixer makes it truly a "one man" unit. Common sense positioning of essential parts makes operation by only one man simple. A saving in manpower!

Look into the profit potential of the Sprout-Waldron Style V Mixer. Talk it over with your Sprout-Waldron representative. You may realize considerable savings.

Buy Sprout-Waldron for the finest processing equipment . . . look to Sprout-Waldron for money-making advice.

# SPROUT-WALDRON & CO.

*Manufacturing Engineers*

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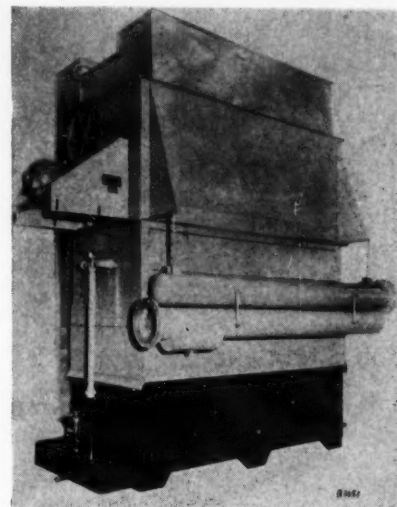
PENNSYLVANIA

acts as a guard against leakage of fumes where toxic gases are being metered. In the latter case, a vent in the end fitting may be provided for the installation of a small pipe to carry fumes outside the building.

### *After Cooler*

QB 254

The improved Aero after cooler of the Niagara Blower Co. for cooling compressed air and condensing and removing the water vapor content uses evaporative cooling of the compressed air. This is ac-



complished by passing it through coils in a spray chamber where atmospheric air, drawn through by fans, evaporates a portion of the recirculating spray water.

In the new equipment greater efficiency is obtained by arranging the compressed air coils laterally across the spray chamber and introducing the compressed air through an oversize manifold located lengthwise on the outside of the casing. The compressed air is withdrawn to the receiver through a similar manifold. This reduces the friction of the compressed air in the coils and secures better contact with the evaporating spray, bringing the compressed air temperature closer to the wet bulb temperatures of the atmospheric air. Since the compressed air temperature reached is always lower than the dry bulb temperature of the ambient air, condensation of water in compressed air lines and tools is prevented.

### *Ingredient Mixing*

QB 255

Employing horizontally placed mulling wheels, mounted on pivot arms, the special Speedmullor of the Beardsley & Piper Co. makes use of centrifugal force for mulling pressure. Centrifugal force, together with specially placed plows, also serves to hold the material to be mull in suspension on the sides of the bowl in contact with the mulling wheels.

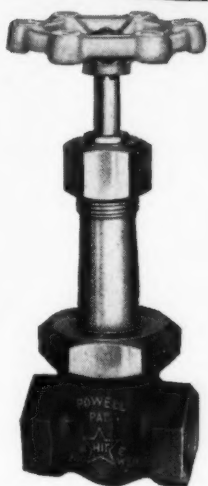
The new Speedmullors are available in six sizes from three cubic feet per batch to 20 cubic feet per batch and will mull ingredients completely in a cycle time of from 1-4 minutes.

**Chemical Industries**

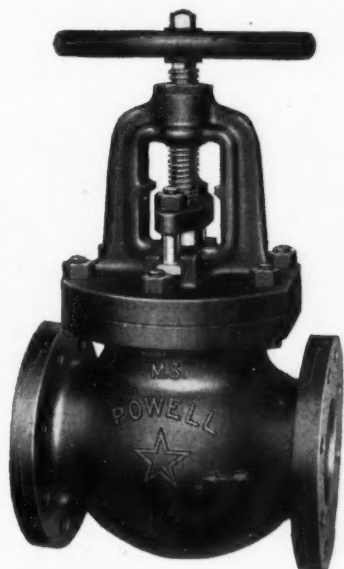
Since  
1846



## Powell Valves have served Industry ...and served it well



Small size 200-pound Bronze Gate Valve for steam, water, oil or gas. Has inside screw rising stem, union bonnet and renewable, wear-resisting "Powellium" nickel-bronze disc.



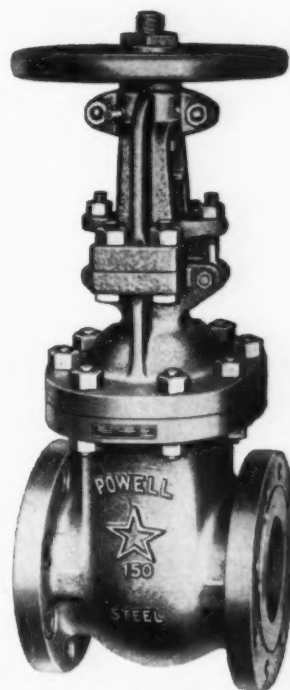
Large Iron Body Bronze Mounted Globe Valve for 125 pounds W.S.P. Made in sizes 2" to 16", inclusive. Has outside screw rising stem, bolted flanged yoke and regrindable, renewable bronze seat and disc. Also available in All Iron.

'Way back in the "horse and buggy days", the first regrinding globe valve was produced and patented by Powell. And ever since then Powell has been a leader in the field of industrial flow control equipment.

As amazing as the changes in methods of transportation have been since 1846, the progress of industry has been well nigh incredible.

Through more than a century of keeping pace with the flow control requirements of each new industrial development, Powell has built such a complete line that today there's a Powell Valve to meet every demand of modern industry.

The Line now includes Bronze and Iron Valves of every required type, design and size; Cast Steel Valves of every type, in pressure classes from 150 to 2500 pounds, inclusive. And, to meet the demands of the Chemical and Process Industries for corrosion resistant valves, Powell makes a complete line, including many special designs, in the widest range of pure metals and alloys ever used in making valves.



Class 150-pound Cast Steel Gate Valve with bolted flanged yoke, outside screw rising stem and taper wedge solid disc.

**The Wm. Powell Company, Cincinnati 22, Ohio**

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

# POWELL VALVES

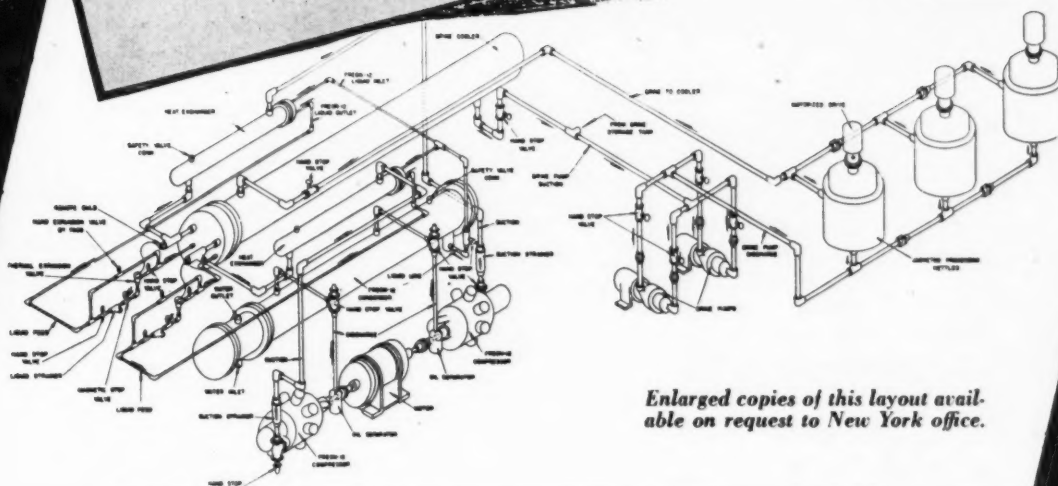
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Fog Nozzle, Water	826	Pump Stroke Adjustment, Feed	820	Work Glove, Neoprene-Coated	644
Folding Crane	260				

# Mixing DDT Ingredients at $-18^{\circ}\text{F}$

PATTERSON-KELLEY  
Heat Exchangers  
AND  
Process Equipment



Enlarged copies of this layout available on request to New York office.

This cooling system, using Freon 12 for chilling calcium chloride brine which in turn chills the contents of the kettles, is indicative of the way Patterson-Kelley engineers can help process plants make effective use of heat-transfer equipment. With 3 Jacketed Kettles, a Cooler, a Condenser, and 2 Heat Exchangers of our design and manufacture, it comes close to being an all-Patterson-Kelley installation.

In planning this installation two basic problems were encountered: (1) the design of jacketed kettles to be operated at sub-zero temperatures; and (2) the design of the cooling system which would most effectively and economically provide the required low temperature.

Write us about your problems if in any way they involve Kettles, Heat Exchangers, Coolers, Condensers, Autoclaves or other heat-transfer equipment.



## THE PATTERSON-KELLEY

112 WARREN STREET, EAST STROUDSBURG, PA.

*Company, Inc.*

BOSTON 16, 96-A Huntington Avenue • NEW YORK 17, 101 Park Avenue • PHILADELPHIA 3, 1700 Walnut Street • CHICAGO 4, Railway Exchange Bldg.

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# PACKAGING & SHIPPING

by T. PAT CALLAHAN

## Ammonium Nitrate Precautions

**F**OURTEEN precautions that should be observed in handling and transporting ammonium nitrate are outlined in a joint report on the Texas City disaster released by the Fire Prevention Bureau of Texas and the National Board of Fire Underwriters.

The report points out that the War Department Ordnance Safety Manual classifies ammonium nitrate as an explosive when it is stored with other combustibles in an explosive area. Smokeless powder regulations apply to ammonium nitrate.

"Proper labeling of containers is of utmost importance," says the report. "The label should be red in color with the words 'Hazardous Chemicals'—'Ammonium Nitrate'—'Handle With Care' prominently displayed with any other notations in small type, preferably of some other color."

The report points out that ammonium nitrate should never be stored in contact with carbonaceous materials or with cadmium, zinc, copper, tin or lead. It recommends also that it be kept apart from combustible commodities like sulphur, flour, sugar, compressed cotton and charcoal.

The fourteen recommendations of the two fire prevention organizations are:

### Storage

1. Material should be stored only in masonry or fireproof sprinklered buildings.
2. Storage should preferably be in separate fire divisions from highly combustible commodities or well segregated.
3. Piles of ammonium nitrate in paper bags in storage should not exceed 10 bags high, six bags wide and 30 bags long with 3 foot separation between piles and handling aisles of 10 feet every 100 feet.
4. Spilled material from broken bags must be re-sacked immediately.

### Handling

5. Ship's holds or boxcars must be thoroughly clean before loading operations are begun.
6. Spilled material in the hold, cars or on dock and discarded sacks must be removed immediately.
7. Proper dunnage and sweat-boards must be used in ship's hold and boxcars to prevent friction and to allow for circulating of air.
8. Smoking or the use of open lights must be strictly prohibited at any time.
9. Other cargo must not be placed in the same hold with ammonium nitrate.

10. Keep material clear of all steam lines and wiring.
11. Pending the outcome of tests now in progress, it is suggested that steam not be used for fire fighting in compartments containing ammonium nitrate.

### Fire Fighting Operations

12. Any ship with ammonium nitrate entering a port must notify the port facility who in turn should notify the chief of the fire department immediately.
13. Fire departments combating ammonium nitrate fires should use only water in large quantities (applied gently so as not to scatter the material) as an extinguishing agent and all personnel entering the fire area must wear masks approved for use in such locations. Fire in ammonium nitrate usually generates large quantities of oxides-of-nitrogen gases which are extremely toxic.
14. Cities in which large industrial operations are present or which are in areas subject to hurricanes, earthquakes, tornadoes and other like disturbances should have a well preconceived and organized Disaster Plan to include all relief, law enforce-

ment, fire fighting, military and naval agencies.

The report points out that the Department of Agriculture does not consider ammonium nitrate as explosive when it is stored in wooden containers or paper bags apart from other explosives. Addition of organic substances to prevent caking or cementing may act like a fuse, the report points out, and increase the possibilities of spontaneous combustion. The addition of other substances like superphosphate and ammonium sulphate may act in the same way.

"Ammonium nitrate usually cannot be detonated by heat or friction," adds the report, "and it is comparatively insensitive.

"It may be exploded under favorable conditions by severe mechanical shock or by sufficiently heavy initiation of an intermediate explosive agent. Fertilizer piles containing this material should not be blasted. A shock may mechanically set up a chain of events which will result in the detonation of the entire mass of material."

The explosive factors of ammonium nitrate are affected by temperatures, crystal structure and impurities or extraneous matter. Numerous striking facts are reported in the illustrated 48-page printed booklet which is based on the data collected at Texas City by Dr. M. M. Braidech, Director of Research of the National Board, and Engineers Hugh V. Keepers and H. H. Davis, of the Texas Bureau.

## ICC Regulations Amended

The following amendments to the Interstate Commerce Commission Regulations for the transportation of explosives and other dangerous articles were promulgated by the I. C. C. on April 18, 1947, and are now in effect. The following articles have been added to the commodity list:

Article	Classed as	Exemptions and packing (see sec.)	Label required if not exempt	Maximum quantity in one outside container by rail express
(Add) Allyl Chlorocarbonate. see Allyl Chloroformate				
(Add) Allyl Chloroformate	Cor. L.	No exemption, 260A	White	5 pints
(Add) Benzyl Chlorocarbonate. See Benzyl Chloroformate				
Add Benzyl Chloroformate	Cor. L.	No exemption, 260A	White	5 pints
Add Lithium amide, powdered	Inf. S.	153, 174A	Yellow	100 pounds

Sections 103 (a) and (b) have been amended as follows:

103 (a) Inflammable liquids, except carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin in excess of one per cent by weight, and zinc ethyl, in inside glass or earthenware containers having a capacity not over 1 pint or 16 ounces by weight each, or inside metal containers not over 1 quart capacity each, packed in strong outside containers, except as otherwise provided, are exempt from specification packaging, marking, and labeling requirements for transportation by rail freight or highway. When for transportation by carrier by water they

are exempt from specification packaging, marking other than name of contents, and labeling requirements.

(b) Inflammable liquids, except carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin in excess of one per cent by weight, and zinc ethyl, in inside containers having a capacity not over 1 pint or 16 ounces by weight each, packed in strong outside containers, are exempt from specification packaging, marking,

and labeling requirements for transportation by rail freight, rail express, or highway. When for transportation by carrier by water they are exempt from specification packaging, marking other than name of contents, and labeling requirements.

The reason for this amendment is to clarify capacities of containers in this section.

Section 105A (b) (1) has been amended by adding the following specification containers:

(Add) (b) (1) Spec. 15A, 15B, 15C, 16A or 19A.—Wooden boxes with inside

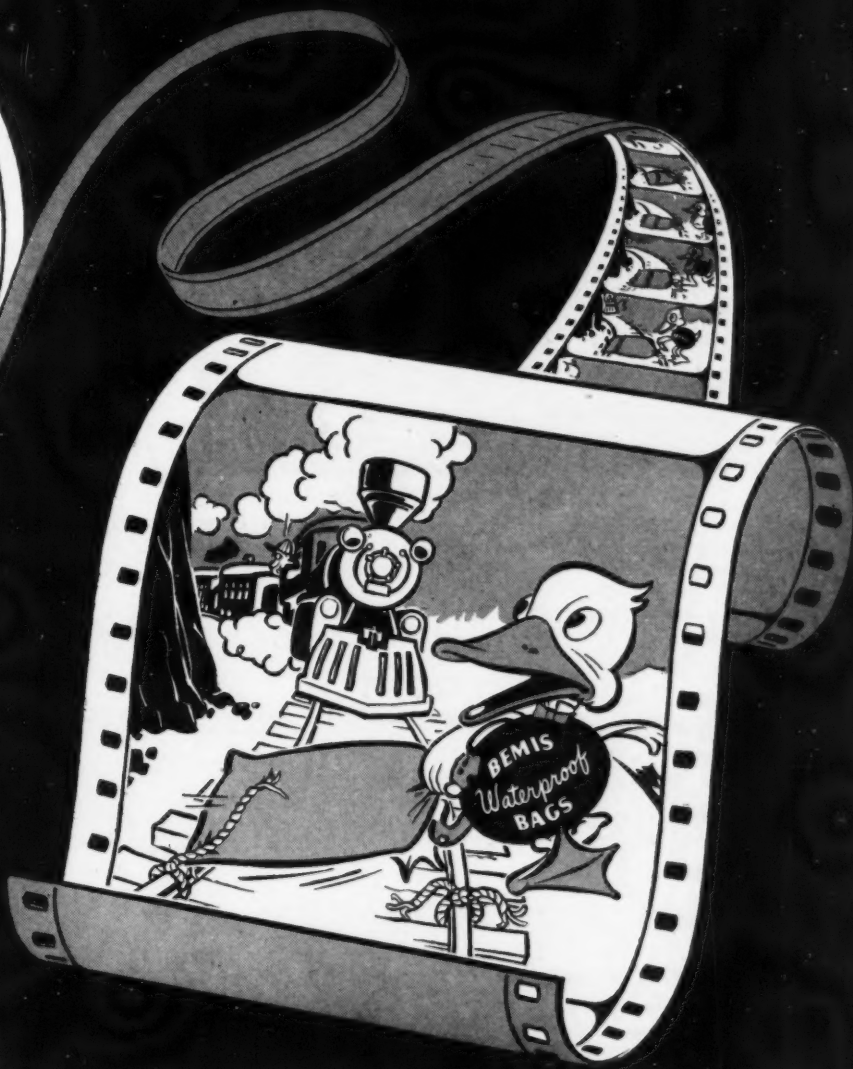
# BEMIS MINUTE MOVIES

for Shippers  
who want to save  
time and money

## "SAVED FROM A TERRIBLE FATE"

**Scenario:** A Powdered Food (a mighty important fellow who goes into many products eaten every day in every American home) has one trouble . . . he's allergic to contamination by the companions with whom he has to travel on the way to work. And once he's contaminated . . . bingo! . . . he's useless. A sad fate for such a fine character! But hold on . . . there's hope!

**Happy Ending:** Yes — Bemis Waterproof Laminated Textile Bags! They protect him from the evil influences lurking in warehouses, freight cars and loading platforms. And do it economically, too. What a break for our friend, Powdered Food! And for you, too!



**PRE-TESTS STOP PROTESTS!** Bemis Waterproof Laminated Textile Bags head off complaints because they are tested *before* they are put to work. Their strength and tear-resistant, puncture-resistant qualities are pre-proved for you. And their economy is attested by thousands of users.

This Bemis Waterproof Bag is light in weight, yet is the strongest shipping bag made. It assures low-cost protection against contamination, escape or absorption of odors, loss of flavor, insect infestation, change in moisture content, sifting, breakage, and many other common shipping complaints. A Bemis Waterproof Bag can also be made acid-, oil-, or grease-resistant. It saves on container and freight

costs, and also reduces damage claims. It's ideal for LCL and export shipments. Empty or filled, it saves storage space.

If the *exact* Waterproof Bag you need doesn't exist, the Bemis Shipping Research Laboratory will design it for you.

**Write today for a copy of "Seven Facts About Low-Cost Protective Packaging"**

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WATERPROOF DEPARTMENT

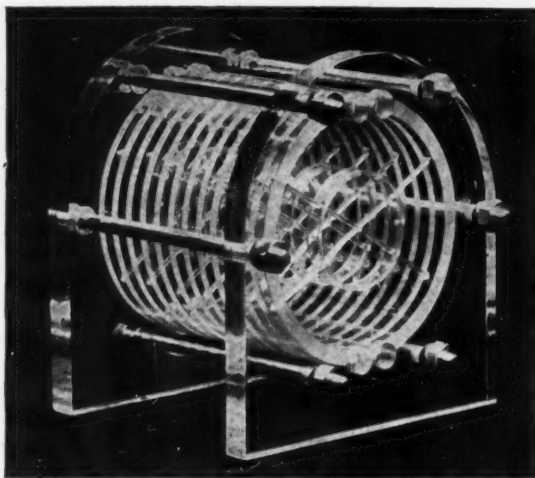
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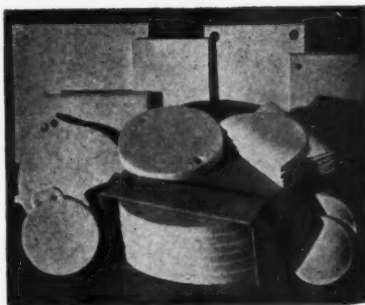
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metal containers, spec. 2A, not over 5 gallons capacity each.

The reason for this amendment is to provide containers for transportation of small quantities of acrolein. There is a necessity for shipping this material in pints, quarts and gallon units.

The note \* to Section 110 has been amended to read as follows:

\* American Society for Testing Materials Method of Test for Vapor Pressure of Petroleum Products (D-323).

The reason for this amendment is to correct ASTM reference which has now been permanently adopted.

The note to sub-paragraph (c) (1), section 110, has been amended in the same manner as above. This is for the same reason: to correct ASTM reference which has now been permanently adopted.

Section 154 (*No exemptions*) has been amended by the addition of sub-paragraph (ww) Lithium hydride. This has been amended to provide for shipment of this material.

Section 174A (a) has been amended to include Lithium amide, powdered, which must be packed as follows:

(b) As prescribed in sec. 173, pars. (b), (c), (f), (i), and (l).

(c) Spec. 21A.—Fiber drums with inside metal drums, spec. 2F.

This amendment is to provide for the shipment of a new material.

Section 175 (*Lacquer base, lacquer chips, dry*) has been amended by the addition of Spec. 21A.—Fiber drums. This amendment has been added to provide an additional container equally as safe as those presently authorized.

Section 206 (a) (1) (*Packing sodium or potassium, etc.*) has been amended as follows:

206 (a) (1) Sodium or potassium, metallic, *lithium metal*, lithium silicon and lithium hydride, must be packed in specification containers as follows:

The reason for this amendment is to correct an inconsistency and to provide for the shipment of new materials.

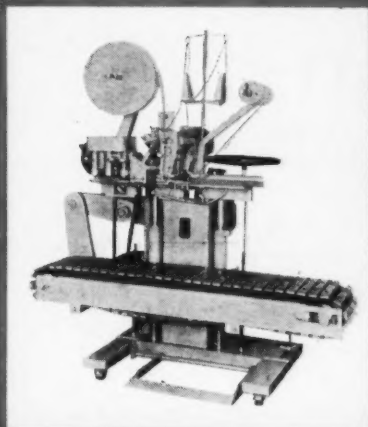
Section 247 (d) (*Packing acetyl chloride, etc.*) has been amended as follows:

(d) Spec. 1A, 1C, or 1D.—Glass carboys in boxes or kegs (not permitted for *antimony pentachloride* or tin tetrachloride, anhydrous).

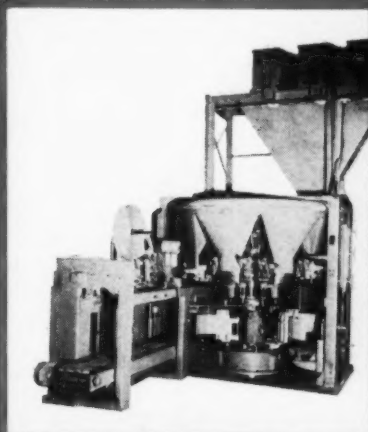
Section 247 (d) (1) (*Packing acetyl chloride, etc.*) has been amended as follows:

(d) (1) Spec. 1X.—Boxed carboys of 5 to 6 gallon capacity; single-trip for export only. For shipment via common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only. (*Not permitted for antimony pentachloride or tin tetrachloride, anhydrous.*)

The reason for the amendment to 247 (d) is to eliminate antimony pentachloride in glass carboys because so far as can be determined, this material is not shipped in larger quantities than 5-pound bottles. The same reason applies for the

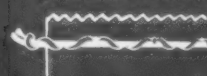


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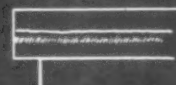
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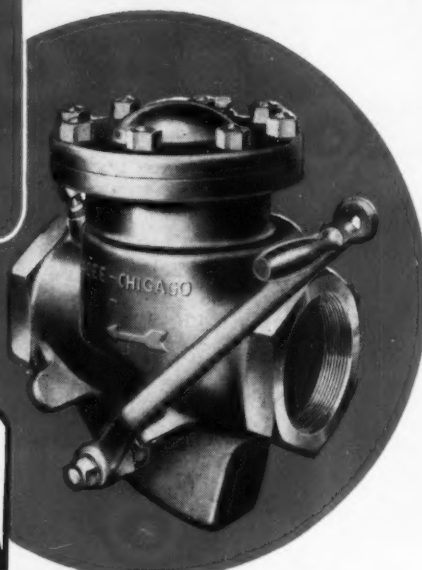
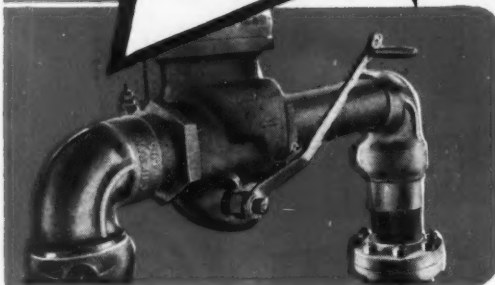
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amendment to 247 (d) (1), Spec. 1X, boxed carboys for export only.

Section 249 (a) and (f) have been amended for clarification to include *alkaline caustic liquids, n.o.s.*

Section 260A has been amended:

(a) *Allyl Chloroformate, benzyl chloroformate, ethyl chloroformate, and methyl chloroformate* must be packed in specification containers as follows:

(b) Spec. 15A, 15B, or 15C.—Wooden boxes with glass inside containers not over 1 pint each, cushioned with incombustible mineral material.

(c) Spec. 1A.—Boxed carboys. Glass bottles having nominal capacity of 3 gallons also authorized when packed and tested in accordance with requirements of Spec. 1A; necks must be protected during shipment.

(Add) (d) *Allyl chloroformate* may, in addition, be packed in specification 5H lead-lined metal drums not over 55 gallons capacity.

The reason for this amendment is to provide for shipping new materials.

Section 271 (d) (Phosphorus oxychloride and phosphorus trichloride) has been amended as follows:

(d) Spec. 103A or 103A-W.—Tank cars, when the tanks of these cars are lead-lined or the tanks are made of solid nickel at least 99 per cent pure and all cast metal parts of the tank in contact with the lading have a minimum nickel content of approximately 96.7 per cent.

The reason for this amendment is to allow nickel castings 96.7 per cent in tank cars as it is not practical to produce castings of 99 per cent pure nickel.

Section 300 (Compressed gas, etc.) has been amended as follows:

300 (a) A compressed gas for the purposes of these regulations is defined as any material or mixture having in the container either an absolute pressure exceeding 40 pounds per square inch at 70° F., or an absolute pressure exceeding 104 pounds per square inch at 130° F., or both; or any liquid inflammable material having a Reid\* vapor pressure exceeding 40 pounds per square inch absolute at 100° F. (See section 326 for gases defined and classified as poisonous.)

(b) Any compressed gas, as defined above shall be classified as an inflammable compressed gas if either, (1) a mixture of 13 per cent or less (by volume) with air forms an inflammable mixture,\*\* or (2) the inflammability range\*\* with air is greater than 12 per cent regardless of the lower\* limit.

The reason is to include various mixtures not heretofore shipped.

Section 303 (i) (*Weight and pressure check*) has been amended as follows:

(i) (1) *Weight and pressure check: Verification of Content: Except as noted in section (i) (2), the amount of liquefied gas charged into cylinders or drums must be determined by weight and this weight must also be checked, after disconnecting from the charging line, by the use of proper scales. The pressure of non-liquefied gas and gas in solution must be*

\* ASTM Method (D-323).

\*\* These limits shall be determined at atmospheric temperature and pressure. The method of sampling and the test procedure shall be acceptable to the Bureau of Explosives. The inflammability range is defined as the difference between the minimum and maximum percentage by volume of the material in mixture with air that forms an inflammable mixture.

You are entitled  
to know the real  
facts behind the  
can situation

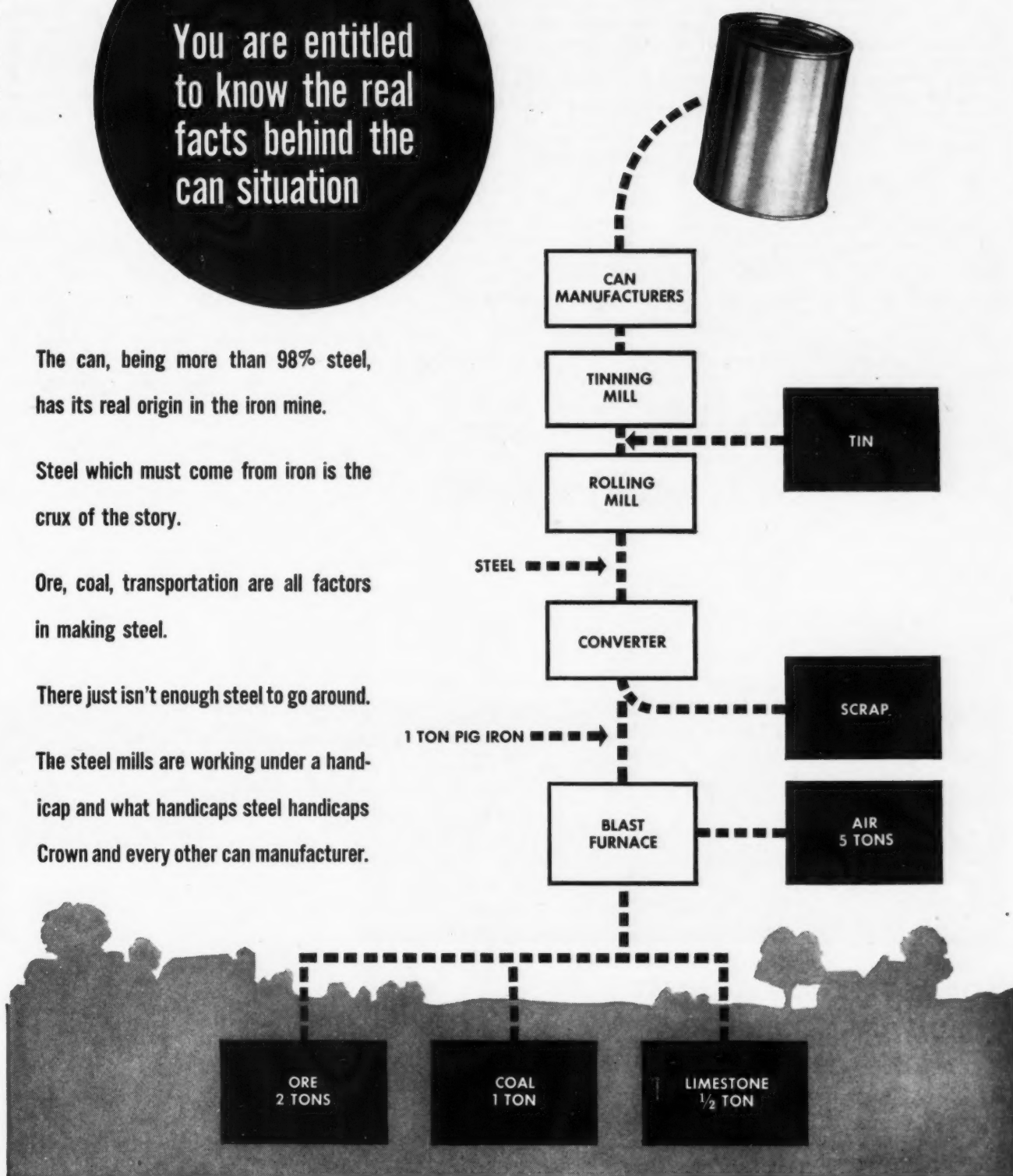
The can, being more than 98% steel,  
has its real origin in the iron mine.

Steel which must come from iron is the  
crux of the story.

Ore, coal, transportation are all factors  
in making steel.

There just isn't enough steel to go around.

The steel mills are working under a hand-  
icap and what handicaps steel handicaps  
Crown and every other can manufacturer.



# CROWN CAN

THE NATION'S THIRD LARGE SOURCE OF SUPPLY

CROWN CAN COMPANY • PHILADELPHIA • Baltimore • Chicago • St. Louis • Houston • Orlando • Fort Wayne • Nebraska City

June, 1947

1005

checked daily on a representative cylinder after it has cooled to a settled temperature.

(i) (2) Cylinders with a water capacity of 200 pounds or more and for use with a liquefied petroleum gas with a specific gravity at 60° F. of 0.504 or greater may have their contents determined by using a fixed length dip tube gauging device. The length of the dip tube shall be such that when the above liquid at a temperature of 40° F. is charged into the cylinder it just reaches the bottom of the tube. The weight of this liquid content shall not exceed 42 per cent of the water capacity of the cylinder. The length in inches of the dip tube shall be stamped on the cylinder and on the exterior of removable type dip tubes. The length of each dip tube shall be checked when installed by weighing each cylinder after filling except when installed in groups of substantially identical cylinders in which case one of each 25 cylinders shall be weighed. The quantity of liquefied gas in each container must be checked by means of the dip tube after disconnecting from the charging line. The outlet from the dip tube shall not be larger than a No. 54 drill size orifice. A container representative of each day's filling at each charging plant shall have its contents checked by weighing after disconnecting from the charging line.

The reason for this amendment is to provide for the use of dip tube gauging devices for verifying the liquefied petroleum gas content of ICC 4B cylinders.

The table section 303, par. (k) has been amended to include Specification

ICC 4B240 cylinders for the shipment of methyl chloride and sulfur dioxide.

This amendment is made necessary due to the extreme shortage of cylinders and the urgent need of the manufacturers of these gases for cylinders.

Section 303, sub-par. (m) (2), has been amended as follows:

(m) (2) Spec. 3, 3A, 3B, 3E, 4, 4A, 4B, 25, 26, or 38; also Spec. 9 or 40, except that mixtures containing carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin, zinc ethyl, or poisonous articles, Class A, B, or C, as defined by these regulations are not permitted unless otherwise prescribed herein. (See sec. 303 (p).)

The reason for this amendment is to provide additional containers for materials other than insecticides, liquefied.

Par. 4 of Spec. ICC 1A (*Capacity and marking carboys*) has been cancelled and the following Par. 4 added to the regulations:

4. Capacity and marking of carboy.—Containers 5 to 13 gallons are classed as carboys. Must be permanently marked to indicate maker and year of manufacture; mark of maker to be registered with the Bureau of Explosives.

The reason for this is for clarification.

Par. 6 (a), Spec. 103 (*Riveting*) has been amended by the addition of the following note:

(Add note to par. 6 (a)) Exception. Tank heads must meet all applicable requirements of these specifications except

that heads may be made of two plates joined by fusion welding.

A new section 553 (*Placards*) has been added to the regulations:

553. Placards prescribed by these regulations must not be applied to cars containing articles not subject to these regulations or specifically exempted therefrom.

The reason for this addition is to specifically prohibit improper use of placards and clarify intent of regulations.

### **Caustic Soda and Potash Handling**

The Manufacturing Chemists' Association has published Chemical Safety Data Sheets SD-9 on caustic soda and SD-10 on caustic potash; the ninth and tenth in the series of chemical product safety manuals being prepared by them. Designed for supervisory staffs and management, the manuals concisely present essential information for the safe handling and use of chemical products.

Copies of the Chemical Safety Data Sheets may be procured at the following prices:

CSDS SD-9—Caustic Soda—

20 cents per copy

CSDS—SD-10—Caustic Potash—

20 cents per copy

from the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington 5, D. C. Send remittance with orders.

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MOISTURE, OXIDATION  
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# The STRANGEST things happen to cans!



**These three cans** of grapefruit juice, en route from Florida, were injured in a very curious way.

They were crushed and crimped together and arrived at their destination compressed into a single unit, as you can see, with no leakage.

A mishap like this could occur in a thousand different ways with the same apparent results.

But interesting as this freak accident

to three cans may be, it's not the important point.

## The Point . . .

More important to you, who use the cans, and to us, who make them, is the fact that the force necessary to crush them into the above state failed to puncture them or rupture the seams.

How do we know this? Because *one year after* these battered containers were

received, the juice was tested and found to be as fresh and untainted as the day it was canned. This means that the hermetic seal on the cans had not been broken.

We don't say that all cans could survive this much punishment, but we do say—

These cans took it! It's another reason for us to repeat: *No other container protects like the can!*

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*No other container protects like the can*

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# Cut

# MIXING COSTS

# 20% or more

One way to reduce material handling costs is to eliminate the extra step of emptying drums into mixing units.

Wherever mixing can be performed by revolving or tumbling the container, "U. S." Drum Mixing equipment can save you time and money.

"U. S." Drum Mixing equipment permits mixing in your own or supplier's drums . . . avoids the costly delays from emptying and cleaning fixed containers . . . eliminates danger of contamination.

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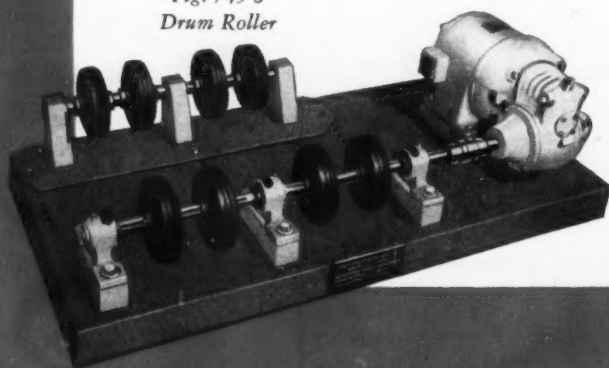
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While our present supply of highly scarce motors lasts, we can make prompt shipment of certain size units. Write or wire for details.

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"U. S." Adjustable Drum Rollers will roll any round container from a one-gallon pail to a 70-gallon drum. Eight heavy-duty rubber wheels are adjustable to provide ample clearance for rolling hoops and bung openings. Powerful, heavy-duty motor will roll loads up to 1,000 lbs. "U. S." Drum Rollers are built in sizes to handle one, two, three, or four drums, constant or variable speed drive.

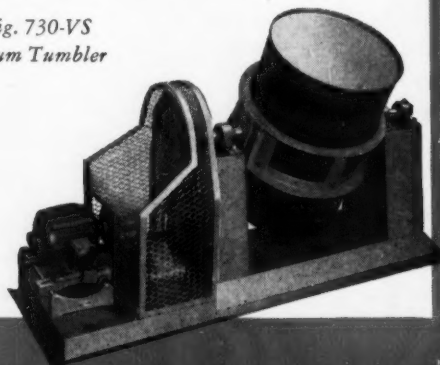
Fig. 745-S  
Drum Roller



## DRUM TUMBLERS

"U. S." Drum Tumblers are built in two sizes: single and double drum units to handle standard 55-gallon drums. Units to handle 30- or 70-gallon drums are available on special making order. Variable speed drive permits tumbling speeds from 8 to 21 RPM. Powerful, heavy-duty motor will handle loads up to 1,000 lbs. Adjustable yoke opens quickly and easily, locks securely.

Fig. 730-VS  
Drum Tumbler



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*Akron, Ohio*

# PLANT OPERATIONS NOTEBOOK

## Why Have Dust Explosions?

DUST explosions, according to Dr. Irving Hartmann, of the Bureau of Mines, have cost 575 lives and \$80,000,000 in the blasts that have taken place in the past fifty years.

Speaking before the American Chemical Society, Dr. Hartmann noted that nearly every combustible solid in a finely divided or dust form is capable of producing dust explosions. "The chief safeguards against dust explosions are the elimination of all sources of ignition from dusty locations: reducing the production of very fine dust as much as possible; use of inert gas atmospheres in dust-producing equipment when practicable; and good housekeeping to prevent the dissemination of dust outside equipment."

In case of an explosion the most common methods for dissipating the large pressures created by a dust explosion are the use of rapidly opening explosion relieving devices or relief vents built into the enclosing wall surfaces. The vents most generally used are free or unrestricted openings, hinged or pivoted sash which swing outward at a predetermined internal pressure, scored glass panes, or light wall panels, paper, metal foil or other diaphragms that burst at a relatively low pressure.

Explosions are initiated by electric sparks and arcs, both in equipment and in faulty wiring, static electrical discharges, frictional or metallic sparks, open flames, overheated machinery, spontaneous ignition, and by disturbance of burning dust layers by the application of streams of water. In many cases the greatest damage resulted from the secondary explosion of settled dust which was thrown into suspension by an initial minor blast.

Continuing, Dr. Hartmann stated: "The necessary conditions for an explosion are a sufficiently dense dust cloud in an atmosphere that will support its combustion and simultaneously a source of ignition that will heat a portion of the cloud to the ignition temperature."

"The explosion is characterized by rapid rise in temperature and by rapid development of pressure, which frequently causes widespread destruction. The pressure results from the thermal expansion of nitrogen and other gases in the explosion space by the heat of combustion, and in some explosions from the generation of gaseous reaction products."

"The ease of ignition of dust clouds and the violence of the resulting explosions are influenced principally by chem-

ical and physical properties of dust, including the composition, heat of combustion, rate of oxidation, specific heat, and fineness, shape and structure of the dust particles; concentration and uniformity of dustcloud; properties of the atmosphere in the explosion space, particularly its oxygen content, inflammable vapor and gas content, initial temperature and pressure, humidity, specific heat, and heat conductivity; nature of ignition source; and size, shape, and construction of the structure in which the explosion occurs.

"In general, fine dust particles are more hazardous than coarse dusts. The small particles disperse into the air more readily. They remain in suspension longer, they ignite at a lower temperature, and

they burn more rapidly than large particles. However, even relatively large particles of 20- to 30-mesh fineness can take part in explosions.

"In order to propagate an explosion, the density of dust clouds must be between certain lower and upper limits of concentration. The strongest explosions are produced at or near a concentration when there is just sufficient oxygen in the air for complete combustion of the dust. For most dusts there exists a critical oxygen limit, below which they will not explode."

## Standard Abbreviations For Use on Drawings

The American Standards Association has just published 2,000 standard abbreviations for use on drawings. These are the product of the work of a national committee, composed of members of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers.

Copies of No. Z32.13-1946, may be obtained from the American Standards Association, 70 E. 45th St., New York, N. Y., for one dollar.

## NOMOGRAPH-OF-THE-MONTH

Edited by DALE S. DAVIS

### Dilution Calculation Nomograph

by WILLIAM C. FRISHE  
Dept. of Chem. Eng. & Metallurgy  
Grove City College  
Grove City, Pennsylvania

CHEMICAL INDUSTRIES will be happy to receive any charts which you may have developed so that they may be shared with your fellow engineers. The authors of each chart published will receive an honorarium of \$10.

AQUEOUS solutions of alcohols are ordinarily made up by pumping the liquid solute into a tank and running in water until the final dilution is obtained. The compositions of the solutions are usually expressed in weight per cent whereas the quantities of solutions are expressed in volume units. To make the necessary calculations to find the final volume when the initial volume of concentrated alcohol and its concentration are known, it is necessary to look up the densities in a handbook, convert volumes to weights and then set up at least one material balance. This process can be greatly shortened by use of the nomograph given here. If (1) the initial volume of strong solution to be diluted, (2) the concentration of the strong solution and (3) the concentration to which the strong solution is to be diluted are known, the volume of the final dilute solution can readily be determined without know-

ing the amount of water to be added.

In the example shown on the nomograph: It is desired to dilute 10 gallons of 90% isopropyl alcohol by weight to 20% by adding water. To what final volume must the solution rise in the tank? Solution: On the nomograph connect the volume of strong solution (10) with the concentration of strong solution (90). This is line No. 1. Connect the desired concentration (20) with the intersection of the pivot line and Line No. 1 and continue this straight line, No. 2, to the volume axis and read the final volume of solution, 38 gallons.

The equation on which the nomograph is based is derived as follows:

Let V, d and C stand for volume, density and concentration, respectively. Let the subscripts 1 and 2 refer to the initial and final conditions. When water is added no solute is added. By material balance of the solute:

$$V_1 d_1 C_1 = V_2 d_2 C_2 \quad (1)$$

The density terms may be eliminated by determination of the density-concentration function. This was done from data for densities of aqueous solutions at 20° C given in the International Critical Tables to give an equation of the form:

$$V_2 = \frac{V_1(a + bC_1) C_1}{(a + bC_2) C_2} \quad (2)$$

The values of a and b were near enough for the compounds:  
methyl alcohol

**HIGHER  
CAPACITY...  
BETTER  
PRODUCTION  
in a fraction  
of the space!**

GRINDING  
EMULSIFYING  
HOMOGENIZING  
MIXING  
DISPERSING  
DISINTEGRATING

**MOREHOUSE  
HY-R-SPEED  
MILL**  
Model SB1400

Requiring only a fraction of the space needed for ordinary mills, the new Model Morehouse SB1400 Mill produces four times as much—better and more efficiently.

This outstanding performance has been proven on a wide variety of materials—both wet and dry—in chemical and general industrial fields.

The unit is portable, requiring no special foundation. Modern design and scientific engineering result in smooth operation—noise and vibration are negligible. Equipped with vertical shaft type motor, and efficient cooling and fume-collecting features, it is economical and dependable.

Priced far below ordinary mills, the Morehouse Hy-R-Speed Model SB1400 will save you substantial amounts both in first cost and in operation. Write today for full information.

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Since 1898



ethyl alcohol  
n-propyl alcohol  
isopropyl alcohol  
n-butyl alcohol  
isobutyl alcohol  
sec. butyl alcohol  
tert. butyl alcohol  
allyl alcohol  
acetone  
ethyl ether  
that they were averaged to give the formula:

$$V_2 = \frac{V_1(100 - 0.2065 C_1)C_1}{(100 - 0.2065 C_2)C_2} \quad (3)$$

By use of the methods outlined by Davis<sup>1</sup> the nomograph was constructed from equation (3).

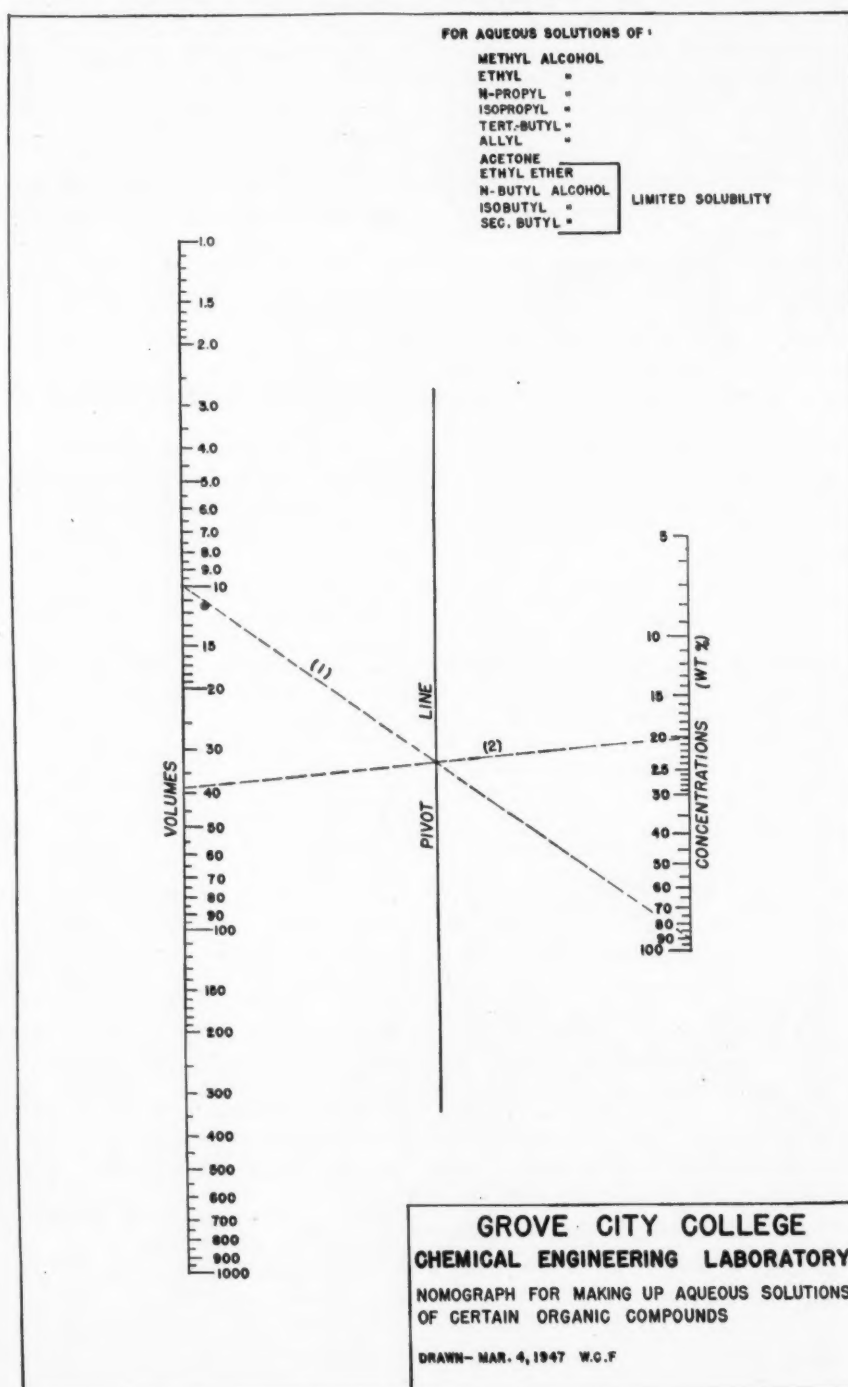
It is important to see that since the volumes are in ratio any unit of volume

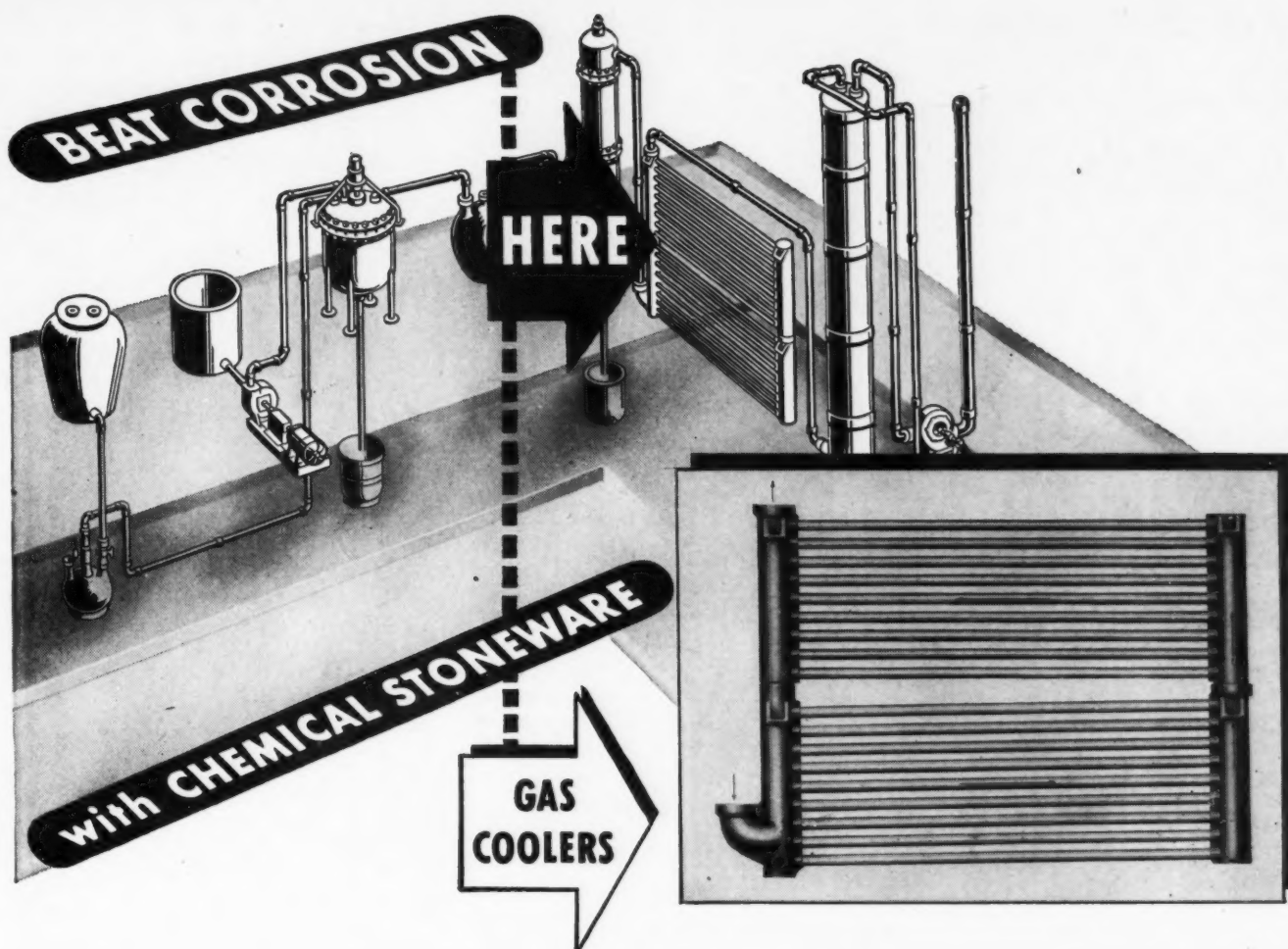
may be employed provided, of course, that consistent units be used for both initial and final volumes. The concentrations must be expressed in weight per cent of the solute. Although the chart is based on data for 20° C., a very small error is involved in ordinary temperature deviations.

Solutions can be made up from this chart at any temperature between 10° C. and 30° C., but initial and final temperatures should be the same. Mixing must be complete. For these compounds of limited solubility the nomograph is applicable only in the solubility range.

### References

<sup>1</sup> Davis, D.S. "Empirical Equations and Nomography", McGraw-Hill Book Company, Inc., New York, N. Y. 1943.





For cooling Corrosive Gases equipment **MUST**: (1) be resistant to acid fumes, (2) have relatively high heat transfer, (3) be of simple construction for economical installation and maintenance.

General Ceramics Coolers pictured above are (1) made of high grade Chemical Stoneware and are not only corrosion resistant but corrosion proof against all strong acid gases with the exception of Hydrofluoric, (2) are manufactured with heat transfer tubes fabricated of a special stoneware body which not only has superior properties of thermal shock resistance and physical strength but has **3 TO 4 TIMES THE THERMAL CONDUCTIVITY** of standard stoneware, (3) are designed for chemical engineers by chemical engineers. They offer sturdy simple construction featuring accessi-

bility of all parts and joints, easy cleaning and convenient tube replacement which does not require dismantling of the entire unit. The coolers pictured above are widely used in the chlorine industry where they have successfully withstood the stringent action of hot (up to 200° F.) saturated chlorine from the cells. Varying capacities can be handled by using one or a multiplicity of units and an installation of General Ceramics tubes for gas coolers with B-41 tubes interconnected by SP-32 piping, valves and fittings, is your guarantee of a satisfactory gas cooling operation.

Send for Circular A which illustrates this equipment and, if you have a specific problem, a letter from you with complete details will result in a proposal giving our recommendations.

2779



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## BUSINESS PAPERS

(Continued from page 972)

technical papers on application of chemicals to pulp and paper industry.

### BOXBOARD AND FIBREBOARD

*Fibre Containers, Board Products Publishing Co.*, 228 N. La Salle St., Chicago 1, Ill.; monthly; \$3.50; covers manufacture of paper board, paper board boxes, and other fibre containers.

*Modern Packaging Encyclopedia*, 122 E. 42nd St., New York 17, N. Y.; annual; \$5; handbook and textbook on manufacture and use of containers, including fibre varieties.

*Official Container Directory*, 228 N. La Salle St., Chicago 1, Ill.; semi-annual; \$5; buyer's guide to containers.

### PLASTICS INDUSTRY

*Industrial Plastics*, 2640 Fairmont Blvd., Cleveland 6, Ohio; monthly; \$4; covers developments in the plastics industry.

*Modern Plastics*, 122 E. 42nd St., New York 17; monthly; \$5; broad coverage of manufacturing and consuming interests in plastics.

*Modern Plastics Encyclopedia*, 122 E. 42nd St., New York 17, N. Y.; annual; \$8.50; covers every phase of plastics of interest to engineers, chemists, businessmen.

*Pacific Plastics Magazine*, 124 4th Ave., Los Angeles 13, Calif.; monthly; \$3.

*Plastics*, 185 N. Wabash Ave., Chicago 5, Ill.; monthly; \$3; concerned principally with application of plastics to production operations.

*Plastics & Resins* (formerly *Plastics & Resin Industry*), 299 Madison Ave., New York 17, N. Y.; monthly; \$3; concerned principally with applications of plastics.

*The Plastics Buyer*, 551 Fifth Ave., New York 17; annual in Sept.; \$3; directory of plastic consumer products with names and addresses of manufacturers.

*Plastics World*, 551 Fifth Ave., New York 17; monthly; free to selected list; concerned principally with uses of plastics.

### RUBBER INDUSTRY

*India Rubber World*, 384 Fourth Ave., New York 16; monthly; \$3; natural and synthetic rubber production and manufacture of rubber products.

*The Rubber Age*, 250 W. 57th St., New York 19; monthly; \$3; natural and synthetic rubber production and manufacture of rubber products; includes market, price and statistical sections.

*Rubber Red Book*, 250 W. 57th St., New York 19; biennial; \$5; directory of rubber manufacturers and suppliers of rubber machinery and supplies; includes 7,000 names and addresses of members of the rubber industry.

### TEXTILE INDUSTRY

*American Wool & Cotton Reporter*, 530 Atlantic Ave., Boston 10, Mass.; weekly; \$3; news, economic, statistical coverage of wool and cotton industries; publishes annual special issue "Official Statistics of Textile Corps."

*American Association of Textile Technologists, Journal of*, 8 East 13th St., New York 3, N. Y.; 3 or 4 times a year; \$3 to non-members; technical and financial papers read before meetings of A.A.T.T.

*Daily News Record*, 8 E. 13th St., New York 3, N. Y.; daily except Sun.; \$15; covers financial, economic, and market trends in all branches of textile field, also technological developments.

*Fairchild's Blue Book Directories*, 8 E. 13th St., New York 3, N. Y.; 20 directories issued twice yearly, 1 directory issued annually; 10¢ each; listings of names, addresses of manufacturers of textiles, apparel and allied products, each directory covering one specific category of merchandise.

*Textile Research Journal*, Textile Research Institute, Inc., 10 E. 40th St., New York 16; annual; \$10; carries technical papers on natural and synthetic fibers, textile treating materials, etc.; contains an abstract section.

*Textile World*, 330 W. 42nd St., New York 18; monthly; \$1.50; broad coverage of all phases of the textile industry.

*Textile World Year Book and Catalog*, 330 W. 42nd St., New York 18; annual; free to selected list; contains mill reference data and buying guide to suppliers of equipment and products used in textile industry.

### LAUNDRY, CLEANING AND DYEING

*Laundry Age*, 9 E. 38th St., New York 16; monthly; \$3; covers laundries and dry cleaners; publishes a special "Laundry & Drycleaning Buying Guide and Directory Issue" each November.

*American Dry Cleaner*, 620 N. Michigan Ave., Chicago 11, Ill.; monthly; free to selected list; covers power operated dry cleaning plants and laundries operating dry cleaning plants.

*Cleaning & Laundry Digest*, 124 W. 4th St., Los Angeles 13, Calif.; monthly; \$1; serves principally cleaning and laundry shops, stores and agencies.

*American Laundry Digest*, 620 N. Michigan Ave., Chicago 11, Ill.; monthly; free to selected list; serves commercial and institutional laundries.

*Cleaning & Laundry World*, 381 Fourth Ave., New York 16; monthly; \$2; covers dry cleaning and laundry plants.

*Dry Cleaning Industries*, 9 E. 38th St., New York 16; monthly; \$2; directory issue in November.

*Laundryman*, 9 E. 38th St., New York 16; monthly; free to selected list, mainly managers of laundries in institutions.

*Laundryman's and Cleaner's Guide*, 56 Marietta St. N.W., Atlanta 3, Ga.; monthly; \$2; directed principally to laundry and dry cleaning plant owners, executives and managers.

*National Cleaner & Dyer*, 304 E. 45th St., New York 17; monthly; \$3; covers dry cleaners and dyeing plants.

*National Rug Cleaner*, 12 E. 30th St., New York 16; monthly; \$3.50; official organ of National Institute of Rug Cleaners, New York Carpet Cleaners Assoc.

*Pacific Laundry & Cleaning Journal*, 121 Second St., San Francisco 5, Calif.; monthly; \$1.

*Southern Laundry and Cleaner*, 344 Camp St., New Orleans 12, La.; monthly; \$2.

*Starch Room Laundry Journal*, 304 E. 45th St., New York 17; monthly; \$3; covers commercial power laundries.

### HIDE AND LEATHER

*Hide & Leather & Shoes*, 300 W. Adams St., Chicago 6, Ill.; weekly; \$5; includes articles on shoe making and tanning.

*Boot and Shoe Recorder*, 100 E. 42nd St., New York 17; semi-monthly; \$3; covers retail phase of shoe industry.

*Blue Book of the Shoe & Leather Industry*, 300 W. Adams St., Chicago 6, Ill.; biennial; included in subscription to *Hide & Leather & Shoes*.

### WATER AND SEWAGE

*Water & Sewage Works*, 155 E. 44th St., New York 17; monthly; \$2; covers treating of water, sewage and industrial wastes; publishes annual reference and data issue.

*Water Works Engineering*, 24 W. 40th St., New York, N. Y.; bi-weekly; \$2.50; covers water treating methods and industry.

*Sewage Works Engineering*, 24 W. 40th St., New York, N. Y.; monthly; \$2; covers sewage and waste disposal.

*The Sewerage Manual*, 310 E. 45th St., New York 17; annual; \$1.50; buyer's guide to equipment and materials for treatment of sewage, includes descriptions of treating processes.

*The Water Works Manual*, 310 E. 45th St., New York 17; annual; \$1.00; same as above for treatment of water.

### PAINT INDUSTRY

*American Paint Journal*, 3713 Washington Ave., St. Louis 8, Mo.; weekly; \$3; covers paint manufacturing industry.

*American Paint and Oil Dealer*, 3713 Washington Ave., St. Louis 8, Mo.; monthly; \$2; covers merchandising and retailing of paint, glass, wallpaper.

*Paint and Varnish Production Manager*, Mills Bldg., Washington 6, D. C.; monthly; \$3; stresses production phase of industry.

*Paint, Oil and Chemical Review*, 537 S. Dearborn St., Chicago 5, Ill.; fortnightly; covers paint and varnish manufacturing industry.

### MISCELLANEOUS

*Bottling Industry*, 33 W. 42nd St., New York 18; bi-weekly; \$5; covers technical phases of carbonated beverages, raw materials, product improvements.

*Ceramic Age*, 421 Park St., Newark, N. J.; monthly; \$3; technical and economic articles on the ceramics industry.

*Ceramic Trade Directory*, 421 Park St., Newark, N. J.; annual; \$6.50.

*Enamel Trade Directory*, 421 Park St., Newark, N. J.; annual; \$6.50; serves vitreous enamel industry.

*Journal of the American Concrete Institute*, 7460 Second Blvd., Detroit 2, Mich.; monthly; free to members, otherwise \$7.50; covers technology of cement and concrete.

*Rock Products*, 309 W. Jackson Blvd., Chicago 6, Ill.; monthly; \$2; all phases of rock, gravel, cement, concrete and lime industries; publishes annual cement issue and annual directory issue.

*Pit and Quarry*, 538 S. Clark St., Chicago 5, Ill.; monthly; \$3; covers non-metallic mineral industries.

*Pit and Quarry Directory*, 538 S. Clark St., Chicago 5, Ill.; annual; \$15 to non-producers.

*Directory Journal*, 354 Fourth Ave., New York 10, N. Y.; quarterly; \$3; a directory of city, county and state directories.

*Institutions Catalog Directory*, 1900 Prairie Ave., Chicago 16, Ill.; annual; \$5; buying guide of products used in institutions.

*Engineering & Mining Journal*, 330 W. 42nd

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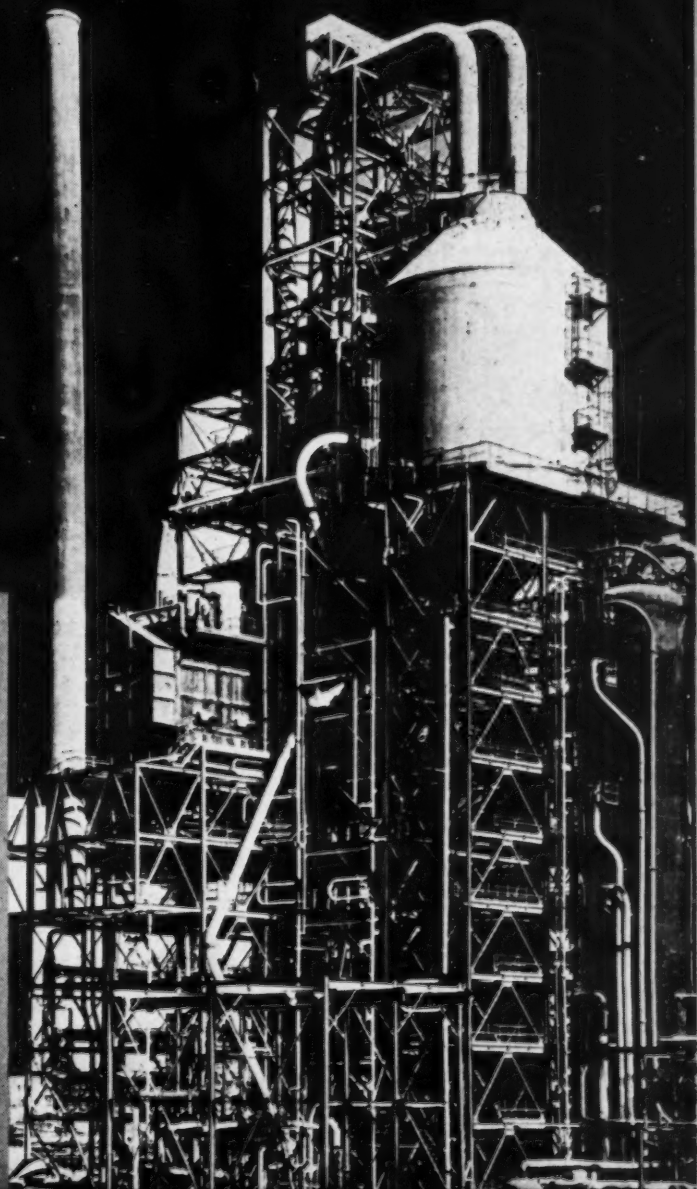
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(Continued from page 1012)

St., New York, N. Y.; monthly; \$3; covers mining, milling, concentrating, smelting and refining of metallic and non-metallic minerals; annual survey and outlook number in Feb.

*Science*, 1515 Massachusetts Ave., N. W., Washington 6, D. C.; weekly; \$7; general journal of science published by American Association for Advancement of Science.

*Sweet's Catalog Service*, 119 W. 40th St., New York 18; an important collection of manufacturers' catalogs compiled under seven major industrial market groups: Architectural, Building, Engineering, Power Plants, Product Design, Mechanical Industries, Process Industries.

*United Roofer*, 431 S. Dearborn St., Chicago 5, Ill.; monthly; \$2; official organ of United Roofing Contractors' Assoc. and its affiliates.

*West Coast Lumberman*, 71 Columbia St., Seattle 4, Washington; monthly; \$2; general coverage of lumber industry, including wood treating and utilization of wood wastes.

*Air Conditioning & Refrigeration News*, 450 W. Fort St., Detroit 26, Mich.; weekly; \$4; covers all phases of refrigeration and air conditioning industry, includes buyer's guide which includes products and their manufacturers in chemical field which are used in refrigeration and air conditioning.

*Refrigeration Data Book*, American Society of Refrigerating Engineers, 40 W. 40th St., New York 18; biannually alternate volumes—Basic and Applications; \$5.

### FOREIGN TRADE PUBLICATIONS

Though some publications of foreign origin are included in the listings in this article, it has not been possible to make a thorough study of the foreign press. However, business journals and directories and proceedings of trade associations in several countries are of importance to the chemical market researcher.

Canada and England in particular have good coverage of technical subjects. Canadian publications are indexed separately in "Industrial Marketing—1947 Market Data Book Number", and are listed fully with U.S.A. publications under the respective trade groupings.

There are a number of "Revistas" on various subjects published in Central and South American countries. Many of these will be found in the regular index both of "Standard Rate and Data Service" and "1947 Market Data Book Number." There are several Russian technical publications of importance, some with English translations. These can be located through abstracting services.

Recently the Chamber of Commerce of Pittsburgh compiled a list of foreign trade magazines published in the United States, which is reprinted below with their permission:

*Primarily for general distribution to foreign merchants and consumers:*

E-S "American Exporter", 386 Fourth Ave., New York 16.

S "America Industrial", 170 Broadway, New York 7.

E-S "Commercial America", Commercial Museum, 34th St. below Spruce, Phila. 4, Pa.

E-S "Guia de Importadores", 440 Fourth Ave., New York 16.

E "International Exporter Buyer's Guide", 1261 Broadway, New York 1.

S "Latin American Buyer's Guide", 1261 Broadway, New York 1.

*Primarily for foreign merchants and consumers in special trade fields:*

E-S "The American Automobile", 330 West 42nd St., New York, N. Y. (autos & accessories).

S "America Clinica", 393 Seventh Ave., New York 14, N. Y. (medical profession).

S "Bebidas", 360 N. Michigan Ave., Chicago 1, Ill. (beverages).

S "Camino y Calles", 330 So. Wells St., Chicago 6, Ill. (road & street construction).

S "Elaboraciones y Envases", 360 N. Michigan Ave., Chicago 1, Ill. (packaging).

(Turn to page 1016)



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*In Canada: Niagara Filter Corp. (Canada) Ltd.*

(Continued from page 1014)

- E "Engineers' Digest," 1 Madison Ave., New York 10, N. Y. (foreign engineering progress).
- S "El Farmaceutico," 330 West 42nd St., New York 18, N. Y. (drug trade).
- S "Graeco Industrial," 416 West 8th St., Los Angeles 14, Cal.
- S "El Indicador Industrial," 220 W. 42nd St., New York 18, N. Y. (industry & machinery).
- S "El Indicador Mercantil," 220 W. 42nd St., New York 18, N. Y. (textiles).
- E-S "Industry and Welding," 812 Huron Rd., Cleveland 15, Ohio.
- S "Ingenieria Internacional Industria," 330 W. 42nd St., New York 18, N. Y.
- S "Ingenieria Internacional Construcion," 330 W. 42nd St., New York 18, N. Y.
- E-S "International Exporter Industrial Guide," 1261 Broadway, New York 1, N. Y.
- S "La Maquina," 360 N. Michigan Ave., Chicago 1, Ill. (machinery and metal working industry supplies).
- P "Oficina Mecanica Moderna," 431 Main St., Cincinnati 2, Ohio (machinery and supplies).
- E-S "Oral Hygiene (Spanish)," 1005 Liberty Ave., Pittsburgh 22, Pa. (Dental profession).
- E-S-P "Pan-American Radio," 45 W. 45th St., New York 19, N. Y.
- S "Petroleo," 117 W. 9th St., Los Angeles 14, Cal.
- E-S "Petroleo del Mundo," 2 West 45th St., New York 19, N. Y.
- E-S "Petroleo Interamericano," 211 So. Cheyenne, Tulsa 1, Okla.
- S "Progreso Medico," 2750 Hudson Co. Blvd., Jersey City 6, N. J.
- S-P "Radio y Articulos Electricos," 360 N. Michigan Ave., Chicago 1, Ill. (radios and home appliances).
- E-S "Refrigeration Industry," 812 Huron Rd., Cleveland 15, Ohio.
- S "Revista Aerea," 515 Madison Ave., New York 22, N. Y.
- E-S-P "Revista Industrial," Penton Bldg., Cleveland 13, Ohio (new equipment).
- E-S "Shoe and Leather Reporter," 210 Lincoln St., Boston 11, Mass.
- S "El Taller Mecanico Moderno," 431 Main St., Cincinnati 2, Ohio (machinery & supplies).
- S "Textiles Panamericanos," 393 Seventh Ave., New York 1, N. Y.
- S "La Tienda," 360 N. Michigan Ave., Chicago 1, Ill. (retail grocery trade).
- E-S "Universal Commerce," 1270 Sixth Ave., New York 20, N. Y. (radio, electrical goods, automobiles).

*Primarily for United States exporters and importers:*

- E "Air Transportation," 10 Bridge St., New York 4, N. Y.
- E "American Import and Export Bulletin," 10 Bridge St., New York 4, N. Y.
- E "Export Trade and Shipper," 20 Vesey St., New York 7, N. Y.
- E "Exporters' Digest and International Trade Review," 170 Broadway, New York 7.
- E "Far East Trader," 1123 Harrison St., San Francisco, Cal.
- E "Foreign Commerce Weekly," U. S. Department of Commerce regional offices or Washington, D. C. (no advertising).
- E "Inquiry Reference Service," U. S. Department of Commerce.
- E "The Journal of Commerce," 63 Park Row, New York 15, N. Y. (newspaper).
- E "The New York Forwarder," 25 Beaver St., New York 4, N. Y.
- E "Shipping Digest," 16 Bridge St., New York 4, N. Y.

*Additional foreign trade publications:*

*Custom House Guide and Foreign Traders Encyclopedia, 10 Bridge St., New York 4; \$20; a general reference book of import and export data.*

*Foreign Trade, the National Research Bureau, Inc., 415 N. Dearborn St., Chicago 10; monthly; \$9 for 6 mos.; abstract service covering articles on imports and exports.*

*Latin American Buyers' Guides, 330 W. 42nd St., New York 18; a series of buyers guides in the pharmaceutical, automotive, construction and general industrial fields distributed free in Latin America.*

*Master Catalog File, Foreign Trades Bureau, 341 Madison Ave., New York 17; semi-annual; an export catalog file for consumer goods.*

### REFERENCE LISTS

*Selected List of Annual "Statistical" or "Review" Issues of Business Periodicals, by Donald T. Clark, assistant librarian, Baker Library, Harvard University, Cambridge, Mass.; lists 76 main publications with such information as frequency of issue, title of annual issue, and time of publication of annual issue.*

*Subject Index, by Margaret Goldsby, Library, American Bankers Assoc., New York, N. Y.; lists publications under an alphabetical arrangement of the industrial classification covered by the publications.*

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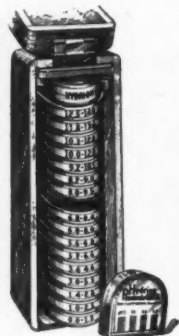
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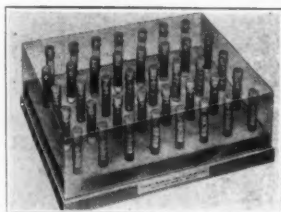
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## Surface Analyzer

Evaluation of surface finish or roughness, essential in specifications for mechanically finished surfaces, may be obtained by a new method in which a carefully prepared plastic replica of the surface is analyzed by photoelectric means.

The replica surface analyzer is based on the use of a plastic replica of a surface which reproduces in minute detail the protuberances and recesses of the surface. The plastic replica is produced by applying a suitable solvent, or solution of plastic in solvent, to the test surface and pressing on a strip of clear plastic film. When dry the film, or replica, is readily stripped from the surface.

The evaluation of a surface consists essentially in passing a restricted beam of light through an oscillating replica, thence through a suitably restricting diaphragm onto a photoelectric cell. The replica is oscillated with respect to the light beam in a straight line or in a curved path with the path of motion maintained so that the light beam will cross the protuberances and recesses of the surface.

Even very minute variations in the number and nature of the protuberances and recesses on the replica film cause corresponding variations in the intensity and angle of refraction of the light transmitted by the replica. The light passing through the restricting diaphragm strikes the photoelectric cell and produces a correspondingly varying current. The average voltage variation, measured by a suitable alternating current electronic voltmeter, is proportional to the variation—from increment to increment on the replica—of the amount of light allowed by the geometric form of each increment to reach the photoelectric cell. Meter readings or records are translated into "roughness" evaluations by calibrating against surfaces of known roughness as determined by microscopic means.

The salient features of the replica method for surface analysis are (1) maintenance of a permanent record of a surface finish, (2) rapid evaluation of a relatively large area of surface in one determination, (3) simplicity of operation, (4) prevention of damage to surface, even for soft materials such as lead or tin-base alloys and (5) availability of the method, since the replica may be prepared in one locality and transported to the location of the analyzer. There are indications that this method may also be applicable for evaluating the corrosion pitting of metals.

The method was developed by the Na-

tional Bureau of Standards, Washington 25, D. C.

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## Vitamin A Assay

The accurate estimation of vitamin A in blood serum, fish oils, and pharmaceutical products may now become a simple routine procedure because of the availability of a new colorimetric reagent. Norman Applezweig, research director of the J. B. Shohan Laboratories of Newark, N. J., has announced that his organization is manufacturing Activated GDH, the new colorimetric vitamin A reagent.

Prepared from glycerol dichlorhydrin, Activated GDH develops a color with vitamin A which is stable for at least eight minutes, permitting its absorption to be determined with ease.

While the colorimetric procedure has been shown to give more accurate results than ultra-violet absorption methods, the use of antimony trichloride has been a serious inconvenience not only because of its fleeting color but also because it is unstable and corrosive.

The new colorimetric reagent is free from these disadvantages. Especially important is the fact that it is unaffected by traces of moisture and leaves no film to interfere with accurate color determination. No special precautions are needed since it is stable and non-corrosive.

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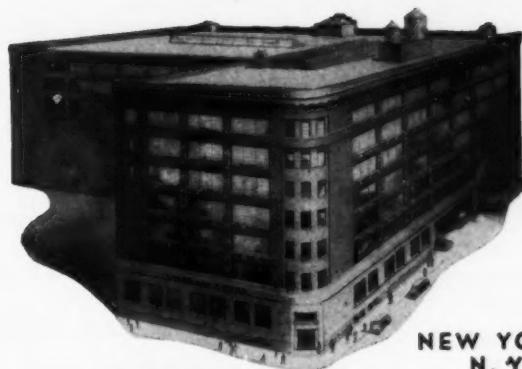
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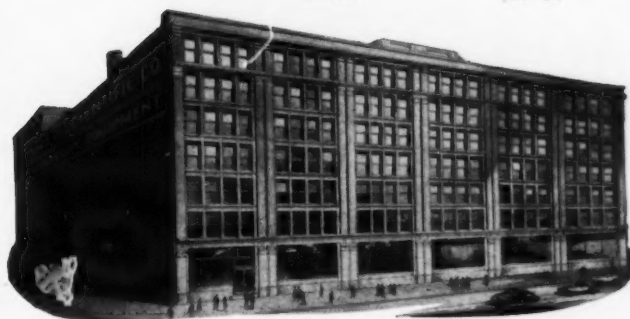
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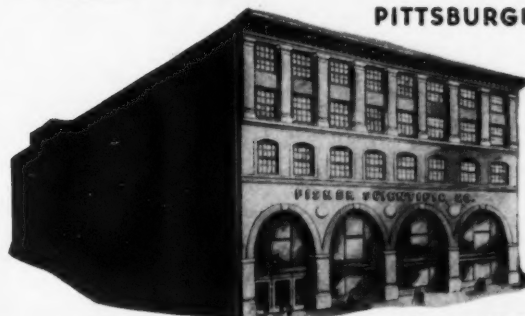
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## Synthetic Rubbers

BUTALASTIC POLYMERS, by *Frederick Marchionna*. Reinhold Publishing Corporation, New York, 1946. 640 pp.; price \$8.50. Reviewed by W. E. Hanford, The M. W. Kellogg Company.

THIS BOOK is essentially a literature search on butalastics (synthetic rubber, from dienes) and represents a great deal of work in collecting the data and assembling it. It has an excellent index which is well cross-indexed, but since the author has used the terminology of the original authors, it is necessary to look under several different names to find all the subject matter.

To me, the book is worth the price as a collection of references along with a brief discussion of what was accomplished. The book covers preparation of vinyl and diene monomers, polymerization methods and processing and industrial application of butalastics. The book is weak when it comes to discussing the mechanism of reactions, the theory of polymerization and the interpretation of the results of various investigators. It is, therefore, not

recommended as a treatise on these subjects. A number of errors of statement were noticed so that caution is suggested in using and quoting this book.

## Microcalorimetry

MICROCALORIMETRY, by *W. Swietoslawski*. Reinhold Publishing Corp., New York City, 1946; 199 pages. Reviewed by Edward J. Prosen, Senior-Investigator in Thermochemistry, National Bureau of Standards.

THE AUTHOR has had a life-long interest in calorimetry and has written many reports on the subject while at the Institute of Technology at Warsaw, Poland, and is thus well qualified to write in this field. He gives a comprehensive description of the methods which have been used in the measurement of small amounts of heat developed by various processes. The descriptions of the methods he and his colleagues have used are described in more detail than are most of those of other investigators. This does not limit the coverage of the subject, however, since he and his colleagues

have studied many of the different methods used in microcalorimetry. The principle and advantages and disadvantages of various microcalorimeters are discussed fully. Some general rules and recommendations are given for the choice of the method to be used in the study of microthermal processes.

In addition to the chapters dealing with the description, evaluation, and suggestions for improvement of specific calorimeters and types of calorimeters, there are several chapters dealing with general aspects of microcalorimetry including "Calorimeter Jackets, Thermostats, and Thermometers," "Method of Comparative Measurements," and "Choice of a Method." In the first of these three chapters, the treatment is adequate except that in treating thermoregulators only the mercury contact type is discussed to the exclusion of other types; also, more modern relays are available than the one discussed. In the chapter on comparative measurements, this method of minimizing some errors in calorimetry is covered. This method is based on sound principle but the interpretation of what is meant by a comparative method is too limited.

This book is recommended to anyone planning to make microcalorimetric measurements and should be useful to many who are making calorimetric measurements in general.

## Light and Matter

THE CHEMICAL ASPECTS OF LIGHT, by *E. J. Bowen, F.R.S.* Second Edition Revised, Oxford Press, 1946. 300 pp.; \$5.00. Reviewed by Professor Victor LaMer.

THE SECOND edition of this book has the same aim as the first: to present modern ideas of matter and light as far as possible in a non-mathematical form. Much of the text has been rewritten, partly to correct errors, but chiefly to replace the "particle" concept of electrons in atoms by the "wave" concept. Wave-mechanics is a difficult subject which cannot by its intrinsic nature be conveyed in a pictorial form, yet such a theoretically unsound task is what is attempted here. So long as the resulting limitations are kept in mind it is better to have a useful but imperfect tool adapted to the chemist's purposes than the pure truth in an unusable form. The treatment is deliberately extensive rather than intensive, and is intended to supplement rather than to replace existing text-books and articles. The author has succeeded admirably in fulfilling this quotation from the Preface. The first chapter, Light as Waves, is the clearest and most succinct presentation of the fundamental features of light with which the reviewer is familiar. Every chemist working in the optical field will want to read it. Then follow chapters on spectra, fluorescence, photochemical reaction, photosynthesis,

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photography, the eye, photo cells and chemiluminescence, with some very useful appendices on filters and a set of interesting and important experiments with light of chemical interest.

Misprints and errors of fact are rare. The reviewer found only one statement which he would seriously question, (page 36) "In the colloidal range of particle sizes  $r=500-2,000 \text{ \AA}$  light scattering is called the 'Tyndall Effect' and is due to diffraction phenomena of great complexity, so that the variation with  $r$  and  $\lambda$  cannot be accurately estimated theoretically. At a particle size of  $r$  about  $\lambda/4$  (about 1,000  $\text{\AA}$ ), i. e. for many colloids, smokes, etc., the amount of scattering rises to a maximum."

The format and organization follows the fine style of the Oxford Press. It would be helpful if authors' names were included in the bibliography. All chemists working in any branch of the optical field will want a copy of this book for ready reference.

### Resin and Rubber Adhesives

THE TECHNOLOGY OF ADHESIVES by John Delmonte. Reinhold Publishing Corporation, New York, 1947, 516 pp., \$8.00. Reviewed by Alexander Frieden, Dir. of Research, Pabst Brewing Co. THIS BOOK is well written and quite readable. There are few typographical

errors. The large number of references at the end of each chapter should be helpful to those interested in consulting the original articles.

In his foreword, the author states that he has "endeavored to tie together as closely as possible, developments in plastics with those in adhesives." It is understandable that Mr. Delmonte, who is technical director of the Plastics Industries Technical Institute, should place the greater emphasis on resin adhesives, and particularly plastics, wood and molded material in general. The growing importance of resin adhesives certainly merits extensive treatment. However, this should not minimize the role that non-resin adhesives play in industry. The volume might well have been restricted in title and material to the technology of resin and rubber adhesives rather than include the somewhat limited treatment given by the author to non-resin adhesives.

The material on resin adhesives is well presented and constitutes an excellent survey of what has been written on the subject. In this reviewer's opinion, the book would have been of even greater value if it had included more critical evaluations of the material presented and more frequent indications as to formulas which are being used successfully and those which have not been found satisfactory, as well as more information on details of application.

This book fills a serious need for more information on resin adhesives and is recommended to anyone interested in the subject. The author is to be commended for accumulating much scattered information into one volume with far greater accuracy and clarity than have the few who have attempted it in the past.

### Other Publications

THE ORGANIZATION AND ADMINISTRATION OF A SPECIAL LIBRARY, edited by Lucille Jackson, outlines the steps and procedures for organizing an industrial, hospital or other special library. This is the only booklet of this type ever published. Copies may be ordered from Ross C. Cibella, Hall Laboratories, Inc., P. O. Box 1346, Pittsburgh 30, Pa. \$5.00.

ACCIDENT PREVENTION MANUAL FOR INDUSTRIAL OPERATIONS, a 544 page manual containing 400 illustrations, charts and tabulations. The book has 14 major divisions and each is preceded by a summarizing index. There is also a detailed alphabetical index. Much of the information is applicable to non-manufacturing industries, although the book was prepared primarily for manufacturing industries. National Safety Council, 20 North Wacker Drive, Chicago 6, Ill. Price \$7.00 for members of the Council and \$14.00 for non-members.

BIBLIOGRAPHICAL BULLETIN, a bibliography of chemical and medical books published throughout the world. International Association of Medical Press, 71, Via M. Macchi, Milan, Italy. Free for members of the Association.

THE ACTIVATOR, resumed after temporary suspension during the war, gives up-to-date information about the chemical and physical properties of the brands of Zinc Oxide recommended for natural and synthetic rubber compounding and tells how the compounding problem for larger than activating amounts of Zinc Oxide in GR-S has been partially solved. Vol. 8, No. 1, Dec. 1946 edition. The New Jersey Zinc Company, 160 Front St., New York 7, N. Y. No charge.

INDEX TO THE BIBLIOGRAPHY OF SCIENTIFIC AND INDUSTRIAL REPORTS, a comprehensive guide to the reports on wartime technological developments in the United States and other countries. The index is intended for use with Ots' weekly Bibliography of Scientific and Industrial Reports. It contains about 45,000 cross references under major subject headings. Superintendent of Documents, G. O. P., Washington, D. C., \$5.00.

FEDERAL LABOR LAWS AND AGENCIES, a handbook containing a simplified description of all the most important Federal Laws and agencies affecting labor. Laws and agencies are classified under general headings such as "Wages and Hours". Copies in limited quantities are available without charge from the Division of Labor Standards so long as the free supply lasts. Larger quantities may be purchased for \$20 a copy from the Superintendent of Documents, G. O. P., Washington 25, D. C.


CHEMICAL FACTS AND FIGURES, 2nd edition, is a statistical yearbook which includes all significant chemical statistics published by official agencies since 1940. Manufacturing Chemists' Association, 608 Woodward Building, Washington 5, D. C. \$2.00.

THE CO-ORDINATION OF MOTIVE, MEN AND MONEY IN INDUSTRIAL RESEARCH is a 64-page booklet on how to organize a working industrial research department. It is illustrated with extensive charts. Standard Oil Co. of Cal., 225 Bush St., San Francisco, Cal. No charge.

INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES, eighth edition, is a completely revised listing of 2,443 industrial research laboratories in the United States. The data included in the directory was collected from August 1945 through January 1946. This book is excellently indexed. It contains excellent Personnel, Subject, and Geographical Distribution of Laboratories indexes. National Research Council, National Academy of Sciences, Washington, D. C. Price \$5.00.

DIRECTORY OF LIBRARIES AND INFORMATIONAL SOURCES IN PHILADELPHIA AND VICINITY, seventh edition, is an alphabetical list of selected libraries in Metropolitan Philadelphia, Wilmington, Delaware and libraries within a 200-mile radius of Philadelphia. It contains Subject and Personnel indexes. Philadelphia Textile Institute, Broad and Pine Sts., Philadelphia 2, Pa.

SYMPOSIUM ON TESTING OF BEARINGS comprises five technical papers on the testing of various types of bearings. A. S. T. M. Headquarters, 1916 Race St., Philadelphia 3, Pa. \$1.50.



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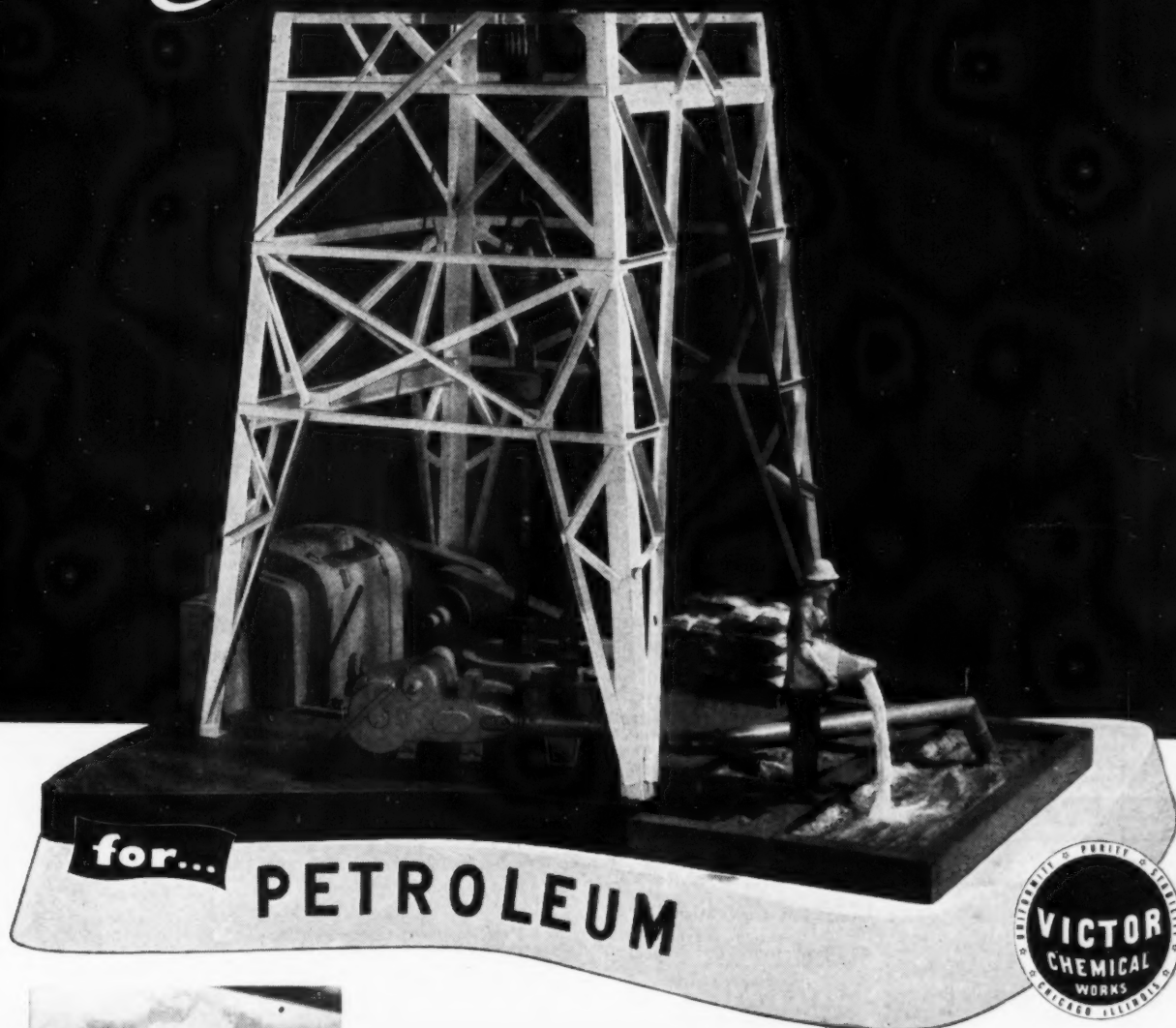
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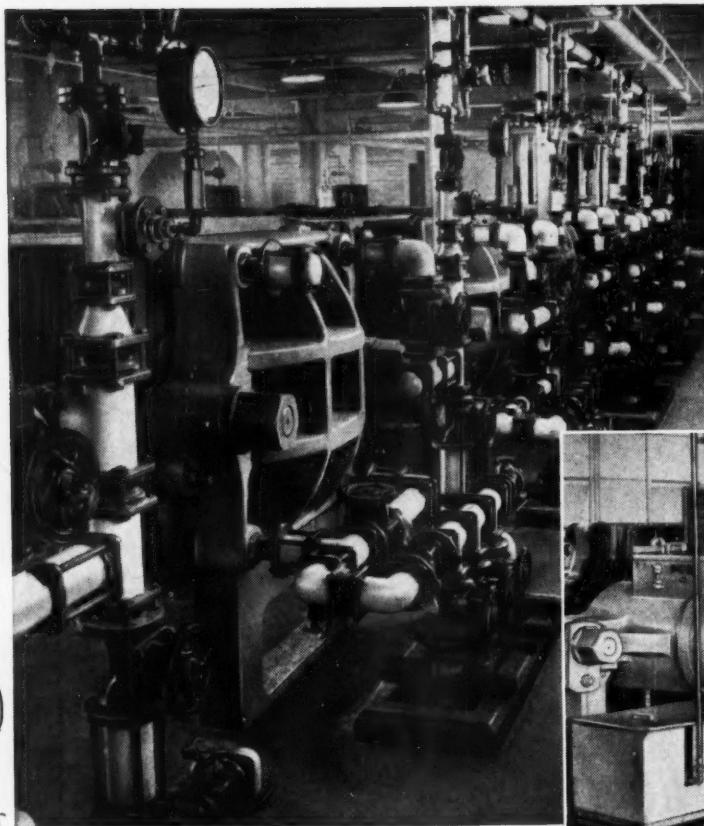
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COMMERCIAL SOLVENTS CORP. has opened two new District Offices in Kansas City, Missouri, and Louisville, Kentucky.

A. B. Swearingen has been appointed district manager at Kansas City. New district manager at Louisville is G. H. Snider who has for many years been associated with the Detroit office.

Plans of the E. I. DU PONT DE NEMOURS & Co. to expand the Sabine River Works at Orange have been approved by the Civilian Production Administration. Investment will total \$722,000.

The new buildings, a rigger shop, a control building and a refrigeration building, will be added to increase the production of adipic acid.

### *McIntyre Named Ferro Vice-President*



*G. H. McIntyre, formerly director of research, Ferro Enamel Corp., advanced to the post of vice-president of the company.*

## CANADA

### *Report Surveys Manitoba's Chemical Prospects*

Manitoba is one of Canada's most fruitful agricultural provinces, but it has long had industrial aspirations. And a good many of the industrialization plans which have been proposed from time to time have been concerned with an expansion of the province's chemical industry.

But this month a four-volume report, prepared by a Montreal company of consulting engineers for the province's Industrial Development Board, surveyed the situation, suggested some possibilities and threw cold water on some highly-publicized chemical proposals.

The report suggests that expansion of the tanning, rock wool, artificial abrasive, paint, soap, and pharmaceutical industries appears warranted. For, in such cases, Manitoba production is well below consumption, and the availability of raw materials, and the existence of high freight rates on finished products from the indus-

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trial east, present favorable opportunities for western manufacturing.

However, the setting up of enterprises to make industrial alcohol, and/or butanol from wheat is frowned upon. The report points to the limited regional market, and the necessity of 25 cents per bushel wheat for competitive success. The possibility of butylene glycol manufacture from wheat is not ruled out—in view of its potential use as an antifreeze—but it is viewed in the "possibility" class only.

The manufacture of casein, dyestuffs and tanning materials, fertilizers, and sodium silicate are regarded as unpromising, at least for the present.

There is little doubt that the report will be used to good advantage by Manitoba's Industrial Planning Board, and that the establishment of the recommended industries will be encouraged.

### *Calco Promotes Loosli*



*Alden R. Loosli, named assistant sales manager, rubber chemicals department, Calco Chemical Division, American Cyanamid Co. He has been with Calco since 1937.*

### *Bakelite Acquires Site For Expansion*

Bakelite Corp. of Canada Ltd., subsidiary of the U. S. concern of the same name, has long held a dominant position in the Canadian market as a producer of phenolic resins. And, within the past few months its parent concern, Carbide and Carbon Chemicals Ltd., has considerably extended its sales activities in the Dominion.

This month, too, Bakelite moved to boost its manufacturing facilities and purchased a 70-acre tract near Belleville, Ont. Plans call for construction of an 86,000 sq. ft. unit and the doubling of Bakelite's output of phenolic and urea resins.

### *Fraser Undertakes Substantial Expansion*

Fraser Companies, Montreal, plans immediate construction of a \$4 million kraft

pulp mill at Newcastle, New Brunswick, according to Aubrey Crabtree, president. It is anticipated that the new unit, which will have an annual capacity of 36,000 tons, will be in operation in 1948.

The company is also undertaking a \$1.5 million extension to its Athol, N. B., bleached sulfite pulp facilities. Present rated capacity of Fraser's mills is 283,000 tons per annum, which will be boosted to 336,000 tons upon the completion of its expansion program.

### Hager Joins Alco Research Div.



**Onslow B. Hager**, named director of research and development, **Alco Oil and Chemical Corp.** He has been working on problems relating to chemical warfare gases.

## PERSONNEL

### Company Officers

**WILLIAM J. MURPHY**, vice-president in charge of sales for the American Potash & Chemical Corp., has been elected to the company's board of directors. He has been with the company since 1913.

**J. ALBERT WOODS** has been elected president and director of Wilson & Toomer Fertilizer Co. He succeeds the late **BAYLESS W. HAYNES**. Mr. Woods was formerly vice president of W. R. Grace & Co.

**JOSIAH B. RUTTER** has been named general manager of the Merrimac Div. of Monsanto Chemical Co. He succeeds **DANIEL S. DINSMOOR** who has resigned to enter the chemical consulting profession.

**JOHN R. DILLON** has been elected chairman of the board of Unexcelled Chemical Corp., and **THEODORE J. KAUFFELD** has been named chairman of the executive committee. Mr. Dillon is also a director of the American Agricultural Chemical Co.

**DONALD E. PAYNE** of the Standard Oil Co. (Indiana) has been appointed assistant general patent attorney and **VANDERVEER VOORHEES** has been advanced to senior patent attorney.

**JOHN A. SARGENT** has been made vice president of finance of the Diamond Al-

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**E. H. SARGENT AND CO.**, long known for the manufacture of high quality polarizing tubes for Saccharimeters and Polarimeters is again manufacturing Bates type Polarimeter tubes. These tubes are made and adjusted to tolerances set by the National Bureau of Standards.

### S-70705 POLARIMETER TUBES

—Metal, Bates type. Constructed of brass, nickel plated, 9 mm inside diameter, with both ends enlarged for reception of air bubbles. This tube is used by the National Bureau of Standards. Complete with 23.5 mm optically inactive cover glasses, rubber washers and black oxidized screw caps.

Length, mm .....	100	200	400
Each .....	\$15.50	\$16.50	\$17.50

### S-70715 POLARIMETER TUBES

—Metal, Bates Type, N.B.S. Certified. Identical with No. 70705, but certified by the National Bureau of Standards to correct length within 0.03 mm.

Length, mm .....	100	200	400
Each .....	\$17.50	\$18.50	\$22.00

### S-70725 POLARIMETER TUBES

—Glass, Bates Type. Similar to No. 70705 but with glass tubes with metal ends. Complete with 23.5 mm optically inactive cover glasses, washers and black oxidized caps.

Length, mm .....	100	200	400
Each .....	\$10.00	\$12.00	\$13.00

### S-70735 POLARIMETER TUBES

—Glass, Bates Type, N.B.S. Certified. Identical with No. 70725, but certified by the National Bureau of Standards to correct length within 0.03 mm.

Length, mm .....	100	200	400
Each .....	\$12.00	\$14.00	\$17.50

### S-70775 POLARIMETER TUBES

—Glass, Enlarged End. With one end enlarged to receive air bubbles. The cover glasses are 15.5 mm and 23.5 in diameter. Constructed to fall within the tolerances allowed by the National Bureau of Standards. Complete with optically inactive cover glasses, rubber washers and black oxidized screw caps.

Lgth., mm	50	100	200	400
Each .....	\$8.50	\$9.00	\$10.00	\$11.00

### S-70785 POLARIMETER TUBES

—Glass, Enlarged End, N.B.S. Certified. Identical with No. 70775, but certified by the National Bureau of Standards to correct length within 0.03 mm.

Lgth., mm	50	100	200	400
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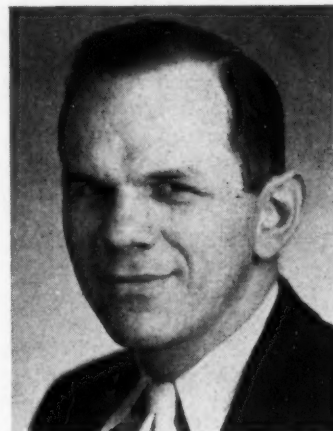
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kali Co. He was formerly treasurer of the company, and has been connected with it since September, 1946.

**Whitman Heads  
Raymond Research**



*Ross Whitman, made assistant director of research for Raymond Laboratories, Inc. He will be in charge of product development phases of research.*

M. W. KELLOGG has been elected to the newly created post of chairman of the board of the Kellogg Corp. He has been succeeded in his previous post as president of Kellogg by H. R. AUSTIN, formerly executive vice-president. Mr. Austin will hold his Kellogg post concurrently with his position as president of The Kellogg Co.

#### **Production**

ROBERT M. EVANS has been made manager of the Industrial Div. of the Plastics Dept. of E. I. du Pont de Nemours & Co. He succeeds EDSALL R. JOHNSON who has retired.

GEORGE DOUGLAS COPELAND has joined the staff of the Exton Chemical and Mineral plants of the Foote Mineral Co. He was formerly associated with the Standard Pressed Steel Co. WILLIAM ROSS THOMSON has also joined Foote as project engineer.

HERMAN C. NOLEN has been appointed vice-president in charge of drug buying policies of McKesson & Robbins, Inc. He has written several books on marketing problems.

ROBERT W. ELKAS has been appointed assistant director of pharmaceutical control for Sharp & Dohme, Inc.

Dr. Elkas comes to Sharp & Dohme from Purdue University, where he has served as a Fellow of the Purdue Research Foundation.

#### **Research**

EDGAR A. THOMPSON has been appointed assistant director of the Technical Div. of the Electrochemicals Dept. of E. I. du Pont de Nemours & Co., Inc. He has been with Du Pont since 1929.

J. C. RUSSELL has been named senior research entomologist of the Whitmarsh Research Laboratories, Pennsalt Mfg. Co. He will have charge of field experimental

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work in agricultural chemicals in the southeast. R. D. TREZISE has been appointed research chemist in the Research Div. of the laboratories.

CLIFFORD F. RASSWEILER, vice-president for research and development of the Johns-Manville Corp., has been chosen chairman elect of the American Chemical Society's New York Section. EDWARD J. DURHAM has been re-elected secretary and H. BURTON LOWE renamed treasurer.

HOWARD J. SMITH has joined the research staff of The Titanium Alloy Mfg. Co. He formerly was chief chemist of Joliet Chemicals, Inc.

C. G. KIRKBRIDE is now director of the Houdry Laboratories, Houdry Process Corp.

RAYMOND F. SCHULTZ, director of the Hercules Powder Co.'s Experiment Station, has been named chairman of the Delaware section of the American Chemical Society.

MARTIN KILPATRICK will succeed to the chairmanship of the department of chemistry at Illinois Institute of Technology next fall.

### Sales

R. W. ANGSTADT has been appointed southern sales manager of the Textile Resin Dept. of American Cyanamid Co. He has been with the company since 1945.

G. F. MEHREN has been made general manager of the mid-western area of Magnus, Mabee & Reynard, Inc. His headquarters are 221 North La Salle St., Chicago.

### Zemaitis Joins Burlington



*Joseph F. Zemaitis, appointed vice-president and technical director, Burlington Mills Inc. He formerly was with Naugatuck Chemicals.*

A chemical salesmen club similar to the Salesman's Ass'n of N. Y. has been formed in Cleveland. The following officers have been elected: C. A. KLEINHANS, president; R. D. KANS, vice-president; CHARLES BLAZIER, Treasurer; and CARL BYRON, secretary.

Westvaco Chlorine Products Corp. has appointed W. NEWALL WYATT division sales manager in charge of dry cleaning specialties and industrial solvents, and A. L. CRANE district sales manager at Detroit. D. C. OSKIN, the previous

Detroit manager, will become division sales manager in charge of alkali and chlorine sales. Recent additions to Westvaco's Agricultural Sales Div. are W. L. SAGER and CHARLES H. TIDWELL.

H. B. PAUL has been assigned as technical representative of the Industrial Chemicals Dept. for the New England district of Atlas Powder Co., and L. G. PARKINSON has been assigned to the mid-west.

## NEWS of SUPPLIERS

At a recent company sales convention W. W. Calihan, director of sales, H. K. Porter Co., reported that the business volume in 1946 far exceeded any year in the corporation's history. Both sales and production have continued at a high level so far this year.

Johns-Manville Corp. has completed the purchase of the factories and other properties of the Goetze Gasket & Packaging Co., Inc., manufacturers of metallic gaskets.

The H. K. Ferguson Co., Industrial engineers and builders, has appointed Gwoh-Liang Lee as its representative in China with headquarters at Hankow. The Ferguson Co., which has operated extensively in the Orient, has been without a sales representative in the Far East since the beginning of the war.

The Bemis Bag Co. has purchased a 9 acre tract in Vancouver, Washington, from the S. P. & S. Railroad. A modern bag plant containing about 75,000 square feet of floor space will be built on this site.

The St. Regis Sales Corp. has opened a multiwall paper bag sales office in Louisville, under the supervision of Charles C. Keefer.

The Electric Hotpack Co., Inc., is now located in new offices at Cottman Ave. and Melrose St., Philadelphia.

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- Natural Products Refining Co., Jersey City
- Sharples Chemicals Inc., Philadelphia
- Stauffer Chemical Co., New York
- United Carbon Co., Charleston
- Howards & Sons Ltd., Ilford, U.K.
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# CHEMICAL SPECIALTIES

*A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.*

## Edco Introduces Novel Aerosol

A new five pound refillable aerosol bomb — Fung-I-Vapor — to control blue mold in tobacco seedbeds was put on the market this month by the Edco Corporation, Newark, Del.

The new unit, which is distributed by Innis, Speiden & Co., New York City, contains benzyl salicylate and cottonseed oil and is propelled by Freon-12.

One-half pound per 100 square yards is the dosage for small plants while larger plants require from one to 1¼ pounds per 100 square yards. One bomb is ordinarily sufficient for 100 sq. yds. of seedbed for one season.

According to Edco, even under epidemic conditions, practically 100% control of blue mold (*Peronospora tabacina*) can be expected.

## Promote Product to Renew Sandpaper

A novel product, designed to renew sandpaper and abrasive cloths, is now being marketed by the Massie Manufac-

turing Co., Minneapolis, under the trade-name of Sand Re-nu.

Packaged in one and five gallon cans, the material is basically a solvent to dissolve pitch and resinous materials which readily clog abrasive papers, sanding belts, rasps, files, and so forth. It is applied by means of a paint brush, then brushed out with a fine wire brush.

According to the maker it will not affect glue bonds, is non-flammable, and non-irritating to the skin.

## Data on New Insecticide Released

A technical bulletin summarizing results of preliminary tests with Toxaphene, a promising new insecticide, against house flies, cockroaches, bedbugs, and other insect pests, has been published by the University of Delaware. Toxaphene, a chlorinated camphene, is manufactured by Hercules Powder Company.

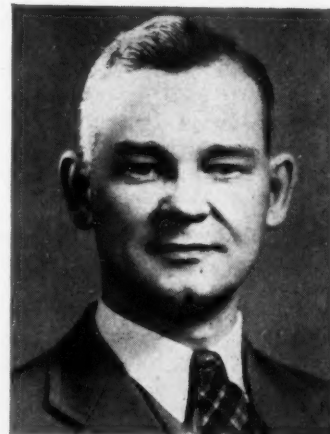
According to this bulletin, high kills with low concentrations of Toxaphene were obtained in the case of the house fly,

the German cockroach, the bedbug, and certain fabric pests—the carpet beetle, furniture-carpet beetle, and the webbing clothes moth.

Preliminary tests also showed that Toxaphene was equally as toxic as DDT to the potato leafhopper, as effective as rotenone against the Mexican bean beetle, and promising for control of codling moth.

In addition to tables presenting results of tests against various insects, the bulletin describes the solubility, stability, and effect of storage on Toxaphene.

## Walton Joins Minnesota Mining



C. W. Walton, formerly with Good-year Tire & Rubber Co., named assistant to the vice president in charge of production, Minnesota Mining & Mfg. Co.

## Hollingshead Appoints Regional Distributors

R. M. Hollingshead Corp., Camden, N. J., has recently appointed Evans Brokerage Co., Memphis, as sales representative in that market for the company's new Whiz Mirror and Glass Finish.

Simultaneously, according to Hollingshead's Grover C. Culshaw, David W. Broadfoot Co., Milwaukee, has been named broker in that territory for Whiz items.

## Promote Recently Developed Paint Odorants

A series of new products, tradenamed Paint-O-Dors, is being introduced by Givaudan-Delawanna, Inc., New York. Designed to neutralize the unpleasant odor of fresh paint, the additives impart a barely perceptible, yet pleasant fragrance, to paints, lacquers, and kindred products.

Added by the manufacturer to oil or water paints, enamels, and lacquers, the products neutralize and mask the paint odor as the paint is applied and dries. The aromatic mixtures are easy to use, inexpensive, and have no effect on the color, viscosity, drying time, or other qualities of paints. They volatilize com-

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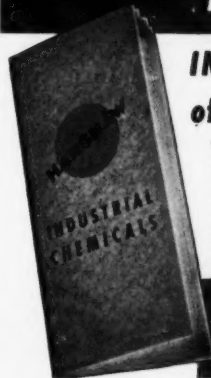
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**RUBBER VULCANIZER** (Industrial & Engineering Chemistry, Jan. '47, "Vulcanization of GR-S with Halogen Compounds")

**INSECTICIDE**—Clothes Moth Control as a synergist and extender. (Unpublished work of Nicholas M. Molnar, Entomological tests conducted by independent laboratories)

Against mosquito larvae (Dept. of Agric. Bur. Ent. & Plant Quar. Pub. E-425, 1938; Ibid, E-585, 1943; Ibid, E-621, 1944)

Against corn earworm infection (Dept. of Agric. Bur. Ent. & Plant Quar. Pub. E-485, 1939)

**MEDICINE**—Particularly in veterinary medicine against cattle diseases. Spraying and dusting of cattle against insects. (Oregon Agric. Experimental Station Tech. Bulletin No. 7 and other references)

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pletely and leave no odor once the paint is dry.

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### ***Sherwin-Williams Expands in the South***

The Sherwin-Williams Co., Cleveland, plans the construction of a \$1 million plant at Atlanta, Ga., according to A. W.

Steudel, president. A site for the factory has already been purchased, and it is anticipated that the new project will be in operation within a year.

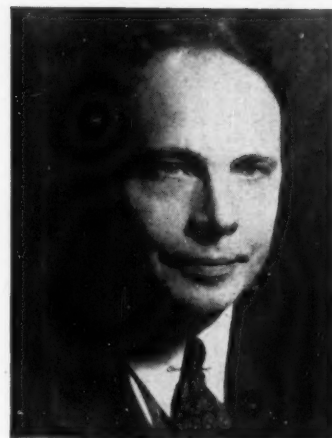
The plant will have a capacity of about a million gallons of paint annually, and will also have facilities for the production of the company's water-emulsion paint, weedkiller, insecticide specialties, as well as waxes and polishes.

### ***Marietta Buys Bleach Manufacturer***

The American Marietta Co., Chicago, has recently acquired Chlorine Solutions, Inc. Figuring in the deal were two plants located at Los Angeles, Cal. and Waco, Texas.

The company is a producer of household and commercial bleaching solutions.

### ***Holland Transfers to Sterling***



***Christian V. Holland, appointed coordinator of manufacturing facilities, Sterling Drug Co. He was previously with Merck & Co.***

### ***Enjay Introduces New Fuel Additive***

The Enjay Co., New York, has recently introduced a new fuel improver under the tradename of Paradyne. Basically the material is a non-volatile petroleum fraction, possessing high solvency, which is being marketed as a gasoline additive.

According to the makers it will be sold only to refineries or bulk plants and it is suggested that a 53 gal. drum of Paradyne is sufficient to treat 10,000 gallons of gasoline.

The additive is designed to act as a gum solvent and contribute to gum-fluxing action to aid in the removal of pre-formed deposits. It also improves upper cylinder lubrication to minimize valve stem seizure.

### ***Trimz Schedules DDT-Paper Promotion***

New York, Chicago, and Indianapolis are the key cities which the Trimz Co. Inc., selected for the introduction of its new DDT-treated ready-pasted children's room wallpaper.

The new product carries a guarantee of one year, although the company claims that tests have proved its insect-killing properties still effective after 2 years of use.

Sold by the box, each carton contains 81 feet of DDT-treated wallpaper and a 20-foot roll of matching border. It is available in two patterns, "Jack and Jill," and the "Disney Favorites." Retail price per box is \$3.99.

### ***New Bubble Bath Base***

Seaboard Distributors, Inc., New York, has recently added a bubble bath base to its line of detergent products. The new item is claimed to possess good foaming characteristics and foam stability.

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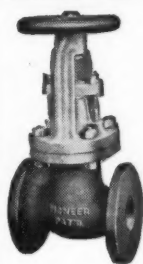
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## CHEMICAL MARKETS

### *Prospects For Drugs and Essential Oils*

Imports of both aromatic and mucilaginous gums during 1946 improved considerably over the previous year with aromatic gums up 300 per cent over the preceding period and mucilaginous products gaining 20 per cent. There are indications too that U. S. purchases of gums abroad will hold up well this year, and may well exceed the 1946 figures.

In addition, although it is likely that many essential oils will not become readily available in the near future, there are signs of a better supply position developing in the latter part of the year. Last year 30 (of a total of 44) major essential oils were imported in greater volume than in the preceding period and stocks on hand gained appreciably. Oil receipts so far this year have been running slightly ahead of 1946 and the odds are that the trend will continue.

Not to be overlooked, too, is a probable paring of demand from cosmetic makers, which should contribute to a better balance in the supply-demand situation.

### *Flaxseed Prospects More Encouraging*

In the past few months there has been much concern over the prospects for domestic flaxseed production—for, naturally, it will have a real bearing on the availability of linseed oil, and outlook for paint manufacturers. At long last, government officials are now optimistic—forecasting a flaxseed crop this summer exceeding the five million acre goal set by the Department of Agriculture last November.

Encouraged by the lush \$6 a bushel support price set by the USDA in January, coupled with the fact that farmers feel that a substantial market awaits the summer crop, still more extensive plantings may materialize.

Whether prices will hold up much above the floor level is a question, however. The odds are that quotations, which have been around \$7.50, will be shaded considerably when August crops are harvested. At present opinion is mixed, but indications are that the price will level out in the \$6.00 to \$6.25 range.

### *Thermosetting Resins To Ease*

Although supplies of thermosetting materials are still critical a moderate but gradual improvement is expected to develop during the third quarter. This easing of the presently stringent situation is expected to materialize mainly as a result of the new plant capacity which should be available later in the year. Nevertheless, it is not anticipated that

such resins will be freely available, unless raw material markets soften appreciably.

The coal situation, with the attendant dearth of derivatives, has had its effect on plastic supplies, as, of course, has the extreme shortage of formaldehyde. However it is probable that most such chemicals will ease somewhat toward the latter part of 1947.

### *Generally Tight Situation Shows Signs of Abating*

Even though there have been many reports current during the past month of too high inventories, and buying retrenchment policies in various industries, the chemical producers have not been faced with such problems. By and large no material easing in the supply position of most chemicals has developed, and output, although on the upgrade, still falls far short of demand. Boxcar, tank car, and other container shortages have complicated distribution problems, and have distorted the production picture somewhat. For, even though chemical output has gained, it has not been clearly reflected in availabilities as a result of delivery bottlenecks.

At present sulfuric acid production comes close to meeting all major needs, but, in spite of a gain in alkali and chlorine tonnage, demand still outstrips supply. There has been a slight easing of caustic, but it has by no means been of any proportion. Nevertheless it is anticipated that solid caustic will become more readily available later this year, but the prospects for flake are not as encouraging.

Coal-derived compounds—particularly naphthalene, creosote oil, and tar acids—continue tight. Nor is there any immediate promise of an easing of the tight market situation which obtains. One fact is obvious. The dearth of naphthalene will not be alleviated in the near future as a result of bolstered domestic output. There is a possibility, however, that some supplies may arrive from Germany later this year.

Agricultural insecticides face a continuing stringent market. Domestic output of refined arsenic is still far below demand, and there is but scant hope of an improvement in the availability of nicotine. Paradichlorobenzene producers are booked months ahead, but the outlook for rotenone is fairly good, in view of the fact that Peru has exceeded its agreement in shipping rotenone-bearing materials. Pyrethrum and DDT supplies offer no real problem, and copper sulfate should be easy to obtain even though prices have crept up.

Essentially, there is no immediate pros-



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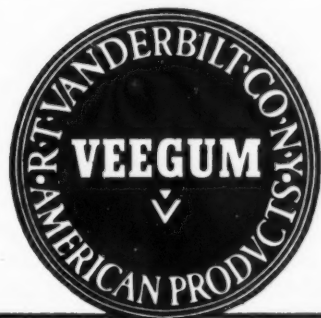
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pect of an easing of demand for most heavy chemicals, but there are indications that the supply-demand position of a number of commodities will come more into balance in the latter part of this year and particularly in the early part of 1948. Therein lies a trend well worth watching.

### Zinc Output Dips

The average daily rate of zinc output from domestic mines in March decreased to 1,774 short tons from the February figure of 1,824 tons, according to the Bureau of Mines.

March zinc production, in terms of recoverable metal, was 54,991 tons, 17 per cent above the 1946 monthly average, and 7 per cent greater than the monthly average during 1945.

### Fertilizer Consumption Hits Record High

Consumption of fertilizer in 1946 totaled approximately 14,900,000 tons, representing an increase of 1,700,000 tons over the previous year, according to the National Fertilizer Association. This tonnage is more than twice the average annual tonnage in 1935-39.

Distribution by commercial producers accounted for 14,530,000 tons of the total 1946 consumption, with the remain-

ing 362,000 tons representing direct distribution by Government agencies. The fourth consecutive annual decline was registered in the tonnage distributed directly by the Government, and such distribution in 1946 was at the lowest point since 1939, although the Government bought, through its Purchase Order Plan, 888,700 additional tons.

### Inorganic Chemical Output Holds Up

High level production of basic inorganic chemicals was maintained during March, according to the Bureau of the Census.

Of the 35 chemicals surveyed on a monthly basis, the March output of 25 compounds was greater than the February output, after allowance for the greater number of working days, and 23 were produced in greater volume this March than during the same month a year ago.

Sulfuric acid, the leading inorganic chemical in volume and in dollar value, was produced during March at a daily average rate about 4 per cent above February and 24 per cent above March, 1946. The nitrogenous chemicals, except synthetic ammonium sulfate, continued to be produced at a rate approximately double that of a year ago.

Chlorine and the alkalis, calcium carbide and the compressed gases, and the majority of the phosphatic materials also recorded greater output this year than last. The chromium chemicals were the only group of compounds produced below the 1946 rate.

### Record Rosin and Turpentine Yields

Production and consumption of rosin and turpentine showed a sizeable increase for the year of April 1, 1946, to March 31, 1947, according to the figures released by the U. S. Department of Agriculture.

The production of gum turpentine for the crop year was 270,286 barrels (50 gallons each), an increase of approximately 11 per cent over the 244,252 barrels produced during the previous year.

Production of steam distilled turpentine increased 30 per cent, to 167,659 barrels, and sulphate turpentine increased approximately 16 per cent to 127,491 barrels. Total production of turpentine for the crop year was 569,985 barrels.

Gum rosin output for the crop year was 752,535 drums (250 pounds each), compared with 694,476 drums in the previous year. Production of wood rosin was 967,713 drums, making a total rosin production of 1,720,248 drums for the year. This was some 18 per cent higher than the previous year.

### Bentonite Production Registers Improvement

Shipments of bentonite last year increased 5 per cent over 1945 and were the highest on record.

The major markets for bentonite, the foundry and petroleum industries, consumed nearly nine-tenths of the total tonnage. Rotary drilling mud consumed 38 percent; foundry sand bond, 27 percent; filtering and decolorizing oils, 24 percent, and the remainder, 11 percent, in a wide variety of uses. Sales for rotary drilling mud increased 42 percent over 1945; foundry sand bond increased 2 percent; oil filtering and decolorizing decreased slightly.

As in 1945, the Wyoming-South Dakota area furnished 66 percent of the total; 35 per cent was produced in Wyoming, and 31 percent in South Dakota. Texas furnished 4 percent, and the remainder came from Mississippi, Arizona, Montana, California, Utah, Colorado, Nevada, and Oklahoma.

### Fertilizer Exports and Imports Dip

Exports of fertilizers and fertilizer materials during February 1947 amounted to 111,000 short tons, valued at \$2,556,000—14 per cent lower than the tonnage reported for a year ago, but 130 per cent higher than for February 1945. Exports of ammonium sulphate and normal super-



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phosphate were considerably higher than for the preceding February; shipments of "other nitrogenous chemicals," Florida land pebble rock, and concentrated superphosphate dropped substantially from a year ago.

Exports for July-February, the first eight months of the current fiscal year, amounted to 855,000 short tons. During this period, exports of phosphate rock, amounting to 499,000 short tons, comprised 58 per cent of total exports.

Imports of fertilizers and fertilizer materials during the month totaled 633,000 short tons with a value of \$2,607,000. With the exception of December 1946, the tonnage was the lowest monthly total reported since August 1944. Compared with the preceding February, the largest

decreases in February 1947 imports were for sodium nitrate, "other nitrogenous materials," and "all other phosphates" while the most significant increases were registered for ammonium nitrate mixtures and bone phosphates.

Imports for July-February of the current fiscal year amounted to 593,000 short tons, of which sodium nitrate made up 23 per cent, compared with 36 per cent during July-February of the 1945-46 fiscal year.

#### **Lead Recovery Declines**

Although total receipts and consumption of, and recovery from, lead-base scrap by secondary smelters were all lower in tonnage, compared with Janu-

ary, the daily average rate was increased in February.

Net receipts of lead-base scrap totaled 56,550 tons, consumption 50,904 tons and secondary metal (lead, tin and antimony) recovered amounted to 41,425 tons.

#### **Sales of Fuller's Earth Up**

Sales of Fuller's Earth in the United States in 1946 were slightly above 1945, according to reports of producers to the Bureau of Mines. The output of 298,752 tons, while 11 percent below the record of 335,644 tons set in 1930, was 14 percent higher than the 1925-29 average of 261,640 tons.

Sales for mineral oil refining increased 5 percent; decreases were reported in all other major uses. Producers reported that 68 percent of the total tonnage was consumed in mineral oil refining; 16 percent in absorbent uses; 8 percent in vegetable oils; 3 percent in rotary drilling mud; and the remainder in insecticides, binders, and other various uses.

Increases in output were reported from Florida, Georgia, and Texas. The Georgia-Florida district produced 49 percent of the total tonnage; Texas, which reported the largest output of any State, furnished 37 percent of the total. The average value rose from \$11.69 in 1945 to \$12.39 in 1946.

#### **Ball Clay Business Improves**

Sales of ball clay in 1946, were 39 percent higher than in 1945, and established a new record, exceeding the 1941 record by 23 percent. Tennessee contributed 54 percent of the total; Kentucky was second with 41 percent; and the balance, 5 percent, came from Maryland and New Jersey.

Eighty-nine percent of the shipments of domestic ball clay in 1946 were used in white pottery or cream-color ware, 7 percent in high-grade tile, and the remaining 4 percent in a variety of products—including kiln furniture, architectural terra cotta artificial abrasives, and glass refractories.

Prices of domestic ball clay ranged from \$3 to \$18.25, depending upon quality and degree of preparation. The average value reported by producers to the Bureau of Mines increased from \$9.11 in 1945 to \$9.85 in 1946, per short ton.

#### **Retort Coke Continues Downward Trend**

Production of retort coke in the United States in 1946 totaled 753,335 net tons, according to producers' reports received by the Bureau of Mines. This decrease of more than 12 per cent from the 1945 output continued the downward trend that started in the early twenties.



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The manufacture of retort coke, dependent on the production of coal gas, declined in recent years principally because of the substitution of water gas, natural gas, or liquefied petroleum gases for coal gas at a number of installations. Conversions were curtailed temporarily during the war years because of shortages of labor and materials but a definite acceleration in conversions was noted in 1946 with one plant changing from the manufacture of coal gas to water gas, 4 plants to natural gas, and 11 plants to propane-air gas.

A total of 174 retorts having an annual coal-carbonizing capacity of 57,000 net tons were reported as being abandoned in 1946, and at the end of the year only 1,787 retorts were in operation of the 2,148 reported in existence. The annual coal-carbonizing capacity of all retorts or ovens in existence on December 31, 1946, totaled 1,608,500 net tons and the rate of operation for the year was 77 per cent of the carbonizing capacity.

The decline in retort-coke production was accompanied by a decline of 12 per cent in the output of crude tar. The yield of crude coal tar per ton of coal carbonized also dropped from 14.11 gallons in 1945 to 14.08. Although ceiling prices on crude coal tar were abolished by the President's Decontrol Order of November 9, 1946, the average unit value per gallon on tar sales increased only \$0.002

over 1945. The principal consumers of coal tar are the tar distillers, and in 1946, 64 per cent of the total sales moved to refining plants.

The recovery of ammonia from coal-gas retorts in the form of ammonia liquor which was practiced at 100 plants producing 14,500,000 pounds of ammonia in 1920 has steadily declined and in 1946 only 1,259,469 pounds were produced at 4 plants.

### Superphosphate Hits Peak

Records were established by the normal superphosphate industry in all phases of activity during the month of March, according to the Bureau of the Census. Based on results of a survey conducted monthly since 1943, the March 1947 production was 5 percent above the previous high established last January and 19 percent above March a year ago.

Shipments surpassed the previous peak set in March 1946 by 858 tons, an increase of slightly under 1 percent, but the month's total exceeded February 1947 by about 14 percent after adjusting the latter for the shorter working month. In March, 24,767 tons more material was used in the producing plants than in April 1946, the former high month, an increase of 6 percent. Stocks on hand at the end of the month failed to set an over-all record figure but were the lowest for any March in five years.

The March production of concentrated superphosphate also set a record, being 4 percent over the previous high, January 1943, and 33 percent greater than last March. The month's shipments total of 33,808 tons was exceeded only by the February 1943 total of 35,307 tons and was 36 percent greater than the figure for March 1936, the previous March high. Stocks of concentrated material at the end of the month were 2 percent below the actual February 1947 total but 47 percent greater than last March.

### Water Paint Sales Gain

Sales of plastic texture water paints during February surpassed the two and one half million pound mark for the second successive month and for the second time since 1930, according to a report released by the Bureau of the Census. Partly because of fewer working days, the February total is almost 650,000 pounds below January, a record month; nevertheless, it is more than double the figure for the corresponding month of last year.

February sales of cold water paints were 4 per cent less than in January but were 36 per cent above February of last year. Dry powder and paste and semi-paste forms of the protein bound interior paint sold in greater volume in February than January. However, sales of other

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Flash, Cleveland Open Cup, °F.	214	255	290
Viscosity, S.U.S. @210°F.	15	48	155
B.S. & W., %	0.1	0.2	0.7
Pour Point, A.S.T.M., °F.	< -20	-15	34
Iodine Number, wjjs	106	121	117
Un sulfonated Residue, A.S.T.M., %	20	6	6
Vacuum Distillation (corrected to atmospheric pressure)			
10%, °F.	464	498	528
50%, °F.	494	600	670
Color	Dark	Dark	(cracked) Dark

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types of cold-water paints, both exterior and interior, declined in comparison with January. The greatest decrease was in the protein bound exterior type.

Calcimines sales were also 4 per cent less than in January but in contrast to cold-water paints were 21 per cent less than a year ago. Sales of these materials has been trending downward and this February's total is the lowest recorded for that month since 1934.

## *Pulp and Paper Up*

Production of paper and paperboard during March, at 1,801,399 tons, broke all previous records. This figure was 172,282 tons above February and 36,906 tons over the previous high set in January 1947. The increase was general throughout the grade structure.

Pulpwood receipts during the month, at 1,822,763 cords, were 38,363 cords below February but 105,117 cords over the March 1946 figure.

Although receipts of fibrous materials, other than pulpwood, increased during the month, the continued high rate of consumption necessitated further withdrawal from inventories. Mill inventories of waste paper on March 31, at 443,280 tons, were 72,081 tons below stocks reported on December 31.

## **Sodium Sulphate**

*(Continued from Page 949)*

ical Corp., at Searles Lake, California. Definite estimates of the potentially available reserves are impossible to arrive at, but production has nearly doubled since 1935. There are 115,000,000 tons of natural deposits in western Canada which are being exploited to meet Canadian demands.

### **RUSSIAN SULFATE?**

There is always the possibility that imports from Germany will be resumed. The imported sodium sulfate, produced by double decomposition of K<sub>2</sub>SO<sub>4</sub> and NaCl in the production of KCl, furnished about 45 per cent (over 255,000 tons per year) of the total supply before 1937. The German supplies, however, are in the Russian zone of occupation, and future disposition depends to a great extent on international political considerations.

One plant, at Weeks, La., is using the Hargreaves process: sodium sulfate and hydrogen chloride from salt, sulfur dioxide, steam and air. A revival of the Deacon process for the production of chlorine by oxidation of HCl may make it desirable to expand along these lines, particularly if the present price for salt cake: \$20-\$26 per ton, should become a permanent fixture in the chemical economy.

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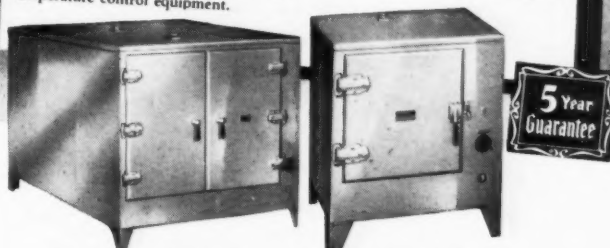
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## CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—\$1.00  
May, 1945, \$0.870 May, 1946, \$0.835

May, 1947, \$0.624

	Current		1947		1946	
	Low	High	Low	High	Low	High
Acetaldehyde, 99%, dra. wks. .lb.	.11	.15	.11	.15	.11	.14
Acetic Anhydride, dra. . . . .lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. . . . .lb.	.07	.09	.07	.10	.06	.07

<b>ACIDS</b>						
Acetic, 28% bbls. . . . .100 lbs.	3.78	4.08	3.38	4.08	3.38	3.63
Glacial, bbls. . . . .100 lbs.	10.65	10.90	9.15	10.90	9.15	9.40
dra. wks. . . . .100 lbs.	13.20	13.75	6.93	13.75	6.93	7.25
Acetylsalicylic, Standard						
USP. . . . .lb.	.45	.59	.45	.59	.40	.59
Benzoin, tech, bbls. . . . .lb.	.43	.47	.43	.47	.43	.47
USP, bbls., 4,000 lbs. up. .lb.	. . . .	.54	. . . .	.54	. . . .	.54
Boric tech, bbls, c-l. . . . .tons	137.50	. . . .	137.50	. . . .	109.00	. . . .
Chlorosulfonic, dra. wks. . .lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran. . .lb.	.22	.23	.20	.23	.20	.21
Cresylic 50%, 210-215° HB, dra. wks, frt, equal. . .gal.	1.16	1.19	1.01	1.19	.81	1.04
Formic, 85%-90% cbys. . .lb.	.12	.14½	.10	.14½	.10	.13
Hydrofluoric, 30% rubber, dra. . . . .lb.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls, wks. .lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls, wks. . . .lb.	.073	.075	.073	.0755	.073	.0755
Maleic, Anhydride, dra. . . .lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys. . . . .100 lbs.	1.50	2.90	1.50	2.90	1.50	2.45
20° cbys, c-l, wks. . . . .100 lbs.	. . . .	2.00	. . . .	2.00	. . . .	1.75
22° cbys, c-l, wks. . . . .100 lbs.	. . . .	2.50	. . . .	2.50	. . . .	6.00
Nitric, 36°, cbys, wks. . . .100 lbs. c	5.00	6.30	5.00	6.30	5.00	5.25
38°, c-l, cbys, wks. . . . .100 lbs. c	. . . .	5.50	. . . .	5.50	. . . .	5.50
40°, c-l, cbys, wks. . . . .100 lbs. c	. . . .	6.50	. . . .	6.50	. . . .	6.00
42°, c-l, cbys, wks. . . . .100 lbs. c	. . . .	7.00	. . . .	7.00	. . . .	6.50
Oxalic, bbls, wks. . . . .lb.	.13	.14	.11½	.14	.11½	.14½
Phosphoric, 100 lb. cbys, USP. . . . .lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls. . . . .lb.	.31	.38	.26	.42	.26	.42
Sulfuric, 60°, tks, wks. . . .ton	. . . .	13.5	. . . .	13.50	. . . .	13.00
66°, tks, wks. . . . .ton	. . . .	17.50	. . . .	17.50	. . . .	16.50
Fuming 20° tks, wks. . . .ton	. . . .	20.50	. . . .	20.50	. . . .	19.50
Tartaric, USP, bbls. . . . .lb.	.49½	.50	.49½	.55	.54½	.71

<b>Alcohol, Amyl (from Pentane)</b>						
tks, delv. . . . .lb.	. . . .	.151	. . . .	.151	. . . .	.131
Butyl, normal, syn, tks. . .lb.	. . . .	.14½	. . . .	.14½	. . . .	.14½
Denatured, CD 14, c-l						
dra. . . . .gal. d	. . . .	1.05	. . . .	1.06	. . . .	.90
Denatured, SD, No. 1, tks. d	. . . .	.98	. . . .	.98½	. . . .	.82½
Ethyl, 190 proof tks. . . .gal.	. . . .	18.08	. . . .	18.08	. . . .	17.94
Isobutyl, ref'd, dra. . . . .lb.	. . . .	.13	. . . .	.13	. . . .	.0860
Isopropyl ref'd, 91%. . . .gal.	.47½	.50½	.41	.50½	.38	.47
<b>Alum, ammonia, lump, bbls.</b>						
wks. . . . .100 lbs.	. . . .	4.25	. . . .	4.25	. . . .	4.25
Aluminum, 98.99% . . . .100 lbs.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd, l.c.l. wks. .lb.	. . . .	.10½	. . . .	.10½	.09	.12
Hydrate, light, bgs. . . . .lb.	. . . .	.17	. . . .	.17	. . . .	.14½
Sulfate, com'l. bgs, wks. . .100 lbs.	1.15	1.30	1.15	1.30	1.15	1.25
c-l. . . . .100 lbs.	. . . .	2.50	. . . .	2.50	. . . .	2.00
Ammonia anhyd, cyl. . . . .lb.	.16	.29	.14½	.20	. . . .	.14½
<b>Ammonia, anhyd, fert, tank cars, wks, frt, equalized. . .ton</b>						
Ammonium Carbonate, USP, lumps, dra. . . . .lb.	.08½	.09½	.08½	.09½	.08½	.09½
Chloride, whi, bbls, wks, 100lbs.	4.75	5.00	4.45	5.15	4.45	5.15
Nitrate, tech, bgs, wks. . .lb.	.0435	.0450	.0435	.0450	.0435	.0850
Oxalate pure, grn, bbls. . .lb.	. . . .	.23	. . . .	.23	. . . .	.23
Perchlorate, kgs. . . . .lb.	. . . .	no stocks	. . . .	no stocks	. . . .	no stocks
Phosphate, dibasic tech, bgs. . . . .lb.	.07	.07½	.07	.07½	.07	.07½
Stearate, anhyd, dra. . . . .lb.	. . . .	.34	. . . .	.34	. . . .	.34
Sulfate, dra, bulk. . . . .ton	30.00	32.00	30.00	32.00	28.20	30.00
<b>Amyl Acetate (from pentane)</b>						
tks, delv. . . . .lb.	. . . .	.21	. . . .	.21	. . . .	.181
Aniline, Oil, dra. . . . .lb.	.13	.14	.12	.14	.11½	.13
Anthraquinone, sub, bbls. .lb.	. . . .	.70	. . . .	.70	. . . .	.70
Antimony Oxide, bgs. . . . .lb.	.26	.31	.21	.31	.15	.21½
Arsenic, whi, bbls, powd. . .lb.	.06	.08	.05	.08	.04	.05½

USP \$25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices. a Powdered boric acid \$5 a ton higher; b Powdered citric acid is ½c higher; c Yellow grades 25c per 100 lbs. less in each case; d Prices given are Eastern schedule.

# Current Prices

## Barium Gums

	Current		1947		1946	
	Low	High	Low	High	Low	High
Barium Carbonate precip, wks, bgs.....ton	67.50	82.00	60.00	82.00	60.00	75.00
Chloride, tech, cryst, bgs, zone 1.....ton	80.00	90.00	73.00	95.00	73.00	78.00
Barytes, floated, paper bgs.....ton	41.95	41.95	41.95	41.95	41.95	41.95
Bauxite, bulk mines.....ton	8.50	10.00	7.00	10.00	7.00	10.00
Benzaldehyde, tech, clys, drs, lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, frt all'd.....gal.	.19	.19	.19	.19	.19	.17
Benzyl Chloride, clys.....lb.	.20 1/2	.23	.20	.23	.20	.24
Beta-Naphthol, tech, bbls, wks.....lb.	.23	.25	.21	.25	.21	.24
Bismuth metal, ton lots.....lb.	2.00	2.00	2.00	1.25	1.80	1.80
Blanc Fixe, 66 2/3% Pulp, bbls, wks.....ton	55.00	60.00	40.00	60.00	40.00	46.50
Bleaching Powder, wks, 100 lbs.	2.75	3.75	2.50	3.75	2.50	3.60
Borax, tech, c-l, bgs.....ton	48.50	51.00	45.00	51.00	45.00	45.00
Bordeaux Mixture, bgs.....lb.	.15	.23	.11	.23	.11	.11 1/2
Bromine, cases.....lb.	.21	.23	.21	.23	.21	.23
Butyl, acetate, norm. drs.....lb.	.30 1/2	.31 1/2	.26	.33 1/2	.1860	.26 1/2
Cadmium Metal.....lb.	1.75	1.80	1.80	1.80	.90	1.55
Calcium, Acetate, bgs.....100 lbs.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs.....ton	50.00	90.00	50.00	90.00	50.00	90.00
Chloride, flake, bgs, c-l.....ton	21.50	38.00	18.50	38.00	18.50	38.00
Solid, 73-75% drs, c-l.....ton	21.00	37.50	18.00	37.50	18.00	37.50
Cy'n'd, min. 21% N, c-l.....lb.	.02 1/4	.02 1/4	.02 1/4	.02 1/4	.02 1/4	.02 1/4
Glucanate, USP, bbls.....lb.	.58	.65	.57	.65	.57	.59
Phosphate tri, bbls, c-l.....lb.	.0635	.0635	.0635	.0635	.0635	.0635
Camphor, USP, gran, powd, bbls.....lb.	.77	.79	.77	.82	.69	.82
Carbon Bisulfide, 55-gal. drs.....lb.	.05	.05 1/4	.05	.05 1/4	.05	.05 1/4
Dioxide, cyl.....lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52 1/2 gal. drs.....lb.	.06 1/2	.07	.06	.07	.69	.80
Casein, Acid Precip, bgs, 10,000 lbs. or more.....lb.	.26	.26	.35	.24	.33	.33
Chlorine, clys, lcl, wks, contract.....lb.	.09	.10 1/2	.08 1/4	.10 1/2	.07 1/4	.07 1/4
clys, c-l, contract.....lb.	.06 1/2	.06 1/2	.06 1/2	.06 1/2	.05 1/4	.05 1/4
Liq, tk, wks, contract.....100 lbs.	2.00	2.30	2.30	2.30	2.30	2.30
Chloroform, tech, drs.....lb.	.20	.23	.20	.23	.20	.23
Coal tar, wks, crude.....bbl.	9.50	10.00	8.25	10.00	8.25	9.00
Cobalt, Acetate, bbl.....lb.	.83 1/4	.83 1/4	.83 1/4	.83 1/4	.83 1/4	.83 1/4
Oxide, black kgs.....lb.	1.16	1.16	1.16	1.16	1.84	1.84
Copper, metal.....100 lbs.	24.00	21.50	24.00	12.00	14.75	14.75
Carbonate, 52-54%, bbls.....lb.	.26	.26 1/2	.19 1/2	.26 1/2	.19 1/2	.20 1/2
Sulfate, bgs, wks, cryst.....100 lbs.	7.60	8.60	7.10	8.60	5.00	7.25
Copperas, bulk, c-l, wks.....ton	14.00	14.00	14.00	14.00	14.00	14.00
Cresol, USP, drs.....lbs.	.13 1/4	.14 1/4	.13 1/4	.14 1/4	.10 1/4	.14 1/4
Dibutylamine, c-l, drs, wks.....lb.	.76	.76	.76	.76	.66	.66
Dibutylphthalate, drs.....lb.	.30 1/2	.34 1/2	.29	.34 1/2	.17	.29 1/2
Diethylaniline, drs.....lb.	.48	.48	.48	.48	.48	.48
Diethyleneglycol, drs, wks.....lb.	.14	.15	.14	.15	.14	.15
Dimethylaniline, drs, cl, lcl.....lb.	.21	.22	.20	.22	.21	.22
Dimethylphthalate, drs.....lb.	.22 1/4	.23	.20	.23	.20	.20 1/2
Dinitrobenzene bbls.....lb.	.16	.16	.16	.16	.18	.18
Dinitrochlorobenzene, dms.....lb.	.14	.15 1/2	.14	.15 1/2	.14	.14
Dinitrophenol, bbls.....lb.	.22	.22	.22	.22	.22	.22
Dinitrotoluene, drs.....lb.	.18	.18	.18	.18	.18	.18
Diphenyl, bbls, lcl, wks.....lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls.....lb.	.25	.25	.25	.25	.25	.25
Diphenylguanidine, drs.....lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, syn. 85-90% tks, frt, all'd.....lb.	.09 1/2	.09 1/2	.09 1/2	.09 1/2	.09 1/2	.09 1/2
Chloride, USP, bbls.....lb.	.20	.22	.18	.22	.18	.20
Ethylene Dichloride, lcl, wks, E. Rockies, drs.....lb.	.09	.09 1/2	.0891	.0950	.0842	.0941
Glycol, dms, cl.....lb.	.12	.12	.12	.12	.10	.10
Fluorspar, No. 1, grd. 95-98% bulk, cl-mines.....ton	37.00	37.00	37.00	37.00	37.00	37.00
Formaldehyde, bbls, cl & lcl.....lb.	.0645	.0695	.0520	.0695	.0520	.0570
Furfural tech, drs, c-l, wks.....lb.	.13	.13	.13	.13	.13	.13
Fusel Oil, ref'd, drs, divd.....lb.	.26 1/2	.27 1/2	.18 1/2	.27 1/2	.18 1/2	.19 1/2
Glauber's Salt, Cryst, c-l, bgs, bbls, wks.....100 lbs.	1.25	1.75	1.05	1.75	1.05	1.45
Glycerine dynamite, drs, c-l.....lb.	.50 1/4	.50 1/4	.50 1/4	.75 1/4	.17 1/2	.55 1/4
Crude Saponification, 88% to refiners tks.....lbs.	.40	.45	.40	.60	.60	.60

## GUMS

Gum Arabic, amber sorts bgs.....lb.	.14 1/2	.15	.13 1/4	.15	.11 1/4	.14 1/2
Benzoin, Sumatra, cs.....lb.	.70	.75	.70	1.00	.52	1.70
Copal, Congo.....lb.	no prices	no prices	no prices	no prices	no prices	.55 1/4
Copal, East India, chips.....lb.	no prices	no prices	no prices	no prices	no prices	.55 1/4
Macassar dust.....lb.	no prices	no prices	no prices	no prices	no prices	.07 1/4
Copal Manila.....lb.	no prices	.25	.25	.13 1/4	.25	.25
Copal Pontianak.....lb.	no prices	no prices	no prices	no prices	no prices	.17 1/4
Karaya, bbls, bxs, drs.....lb.	.21	.30	.21	.50	.18	.50

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, clys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.



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Butyl Stearate

Butyl Oleate

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Manufacturing Chemists

PROVIDENCE, R. I.

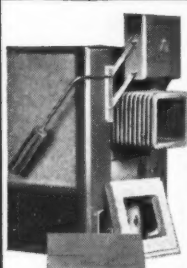
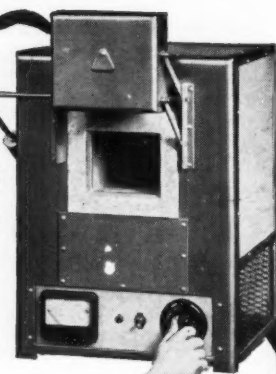
Established in 1815

Plants at Dighton, Mass. and Charlotte, N. C.  
NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE

# TEMCO

## ELECTRIC MUFFLE FURNACE . . .

**Model OFE  
for Shop  
and Laboratory**



• Muffle of ceramically bonded aluminum oxide is replaceable complete with nickel-chrome heating element. New coiled heating element can be furnished for rewinding old muffle core.

**SPECIFICATIONS**  
Size—Overall 22" x 34" x 18"  
Muffle chamber—6" x 5" x 10"  
Operating temperature  
Continuous 1600° F.  
Intermittent 1900° F.  
Current consumption  
2300 Watts maximum  
Shipping weight—170 lbs.  
Price—115 V. or 230 V. \$194.00

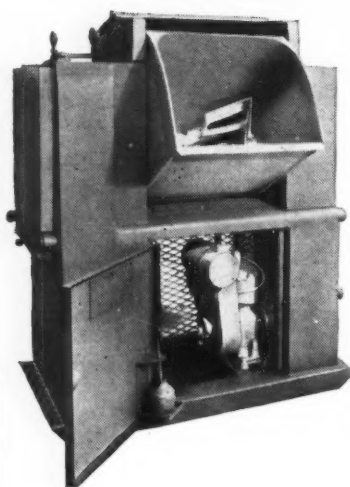
A sturdy, modern electric furnace, with maximum convenience and economy in operation.

On the instrument panel is mounted a dependable pyrometer calibrated to 2000° F. and 1100° C., and a synchronous motor driven percentage timer which controls the current input. By turning the "TEMCO" knob the heating period is adjustable from 2% to 98% of a one minute cycle, giving close temperature selection over the full heating range.

See your supply house or write  
**THERMO ELECTRIC MFG. CO.**  
463 W. Locust St., Dubuque, Ia.

## PAINT MIXERS

M'd By CENTURY MACHINE CO.



**Immediate Delivery**

**Type F D M**

Dimensions: 46" high;  
39" wide; 20" deep.

Capacity: 86 to 88  
Gals. in 18 minutes.

**Manual Dumping**

**Automatic Unloading**

Powered by 1½ H.P.  
Briggs & Stratton Gas-  
oline Engine, Chain  
Drive Variable Speed,  
Manually Operated.

If electrical power is desired, we will supply and install an electric motor of your own specification instead of the gasoline engine.

Wire, Write or Phone MAIN 4—5181.

**Benjamin's for Motors**

130 CLINTON STREET  
BROOKLYN 2, NEW YORK

## Current Prices

## Gums Saltpeter

	Current		1947		1946	
	Low	High	Low	High	Low	High
Kauri, N. Y.						
Superior Pale XXX.....lb.	no prices		nom.			.65½
No. 3.....lb.	no prices		nom.			.22
Sandarac, bgs.....lb.	.85	.90	.85	.95	.90	.99½
Tragacanth, No. 1, cases.....lb.	4.00	5.00	4.00	5.25	3.75	5.25
No. 3.....lb.	2.25	2.50	2.25	3.45	2.10	3.45
Yacca, bgs.....lb.	no prices		nom.		.05	.07½
Hydrogen Peroxide, cbys.....lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars.....lb.	2.10		2.10	1.75	2.10	
Lead Acetate, cryst. bbls.....lb.	.19½		.19½			.16½
Arsenate basic, bg, lcl.....lb.	.22½	.23½	.23½	.12	.18	
Nitrate, bbls.....lb.	.17½	.18	.18		.12½	
Red, dry, 95% PbO <sub>4</sub>						
bbls.....lb.	.176	.18½	.14½	.19½	.09	.16
97% PbO <sub>4</sub> , bbls delv.....lb.	.1785	.18½	.15	.19½	.09½	.16½
98% PbO <sub>4</sub> , bbls delv.....lb.	.181	.19	.15½	.19½	.08½	.17
White, bbls.....lb.	.15½	.16½	.13	.17½	.07½	.14½
Basic sulfate, bbls, lcl.....lb.	.15½	.15½	.12½	.15½	.07½	.13½
Lime, Chem., wks, bulk.....ton	6.50	10.25	6.50	10.25	6.50	10.25
Hydrated, f.o.b. wks.....ton	8.50	12.00	8.50	12.00	8.50	12.00
Litharge, coml, delv. bbls.....lb.	.16½	.17½	.13	.17½	.08	.15½
Lithopone, ordi., bgs.....lb.	.05½	.06	.03	.06	.04½	.05½
Magnesium Carb, tech, wks.....lb.	.07½	.10½	.07	.10½	.07½	.10½
Chloride flake, bbls, wks						
c-l.....ton	37.00		37.00		32.00	
Manganese Chloride, Anhyd.						
bbls.....lb.	.14	.16	.14	.16	.14	.18
Dioxide, Caucasian bgs,						
lcl.....ton	74.75	79.75	74.75	79.75	74.75	79.75
Methanol, pure, nat, drs.....gal. l	.63	.73	.63	.73	.63	.73
Synth, drs cl.....gal. m	.34½	.41½	.31	.41½	.24	.38
Methyl Acetate, tech tks.....lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv.....lb.	.09½	.10½	.09½	.10½	.09½	.110½
Chloride, cyl.....lb.	.33	.41	.32	.41	.32	.40
Ethyl Ketone, tks, frt all'd lb.		.09		.09		.09
Naphtha, Solvent, tks.....gal.		.28		.28		.27
Naphthalene, crude, 74°, wks						
tks.....lb.	.035	.0475	.035	.083	.0275	.035
Nickel Salt, bbls, NY.....lb.	.14	.14½	.14	.14½	.13	.14½
Nitre Cake, blk.....ton	20.00	24.00		24.00		16.00
Nitrobenzene, drs, wks.....lb.	.08½	.09½	.08	.09½	.08	.09
Orthoanisidine, bbls.....lb.		.70		.70		.70
Orthochlorophenol, drs.....lb.	.25	.31	.25	.31	.25	.27
Orthodichlorobenzene, drs.....lb.	.07½	.08	.07	.08	.07	.08
Orthonitrochlorobenzene,						
wks.....lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, drs.....lb.	.08	.09	.08	.09		.09
Paraldehyde, 98%, wks lcl.....lb.		.13		.13		.12
Chlorophenol, drs.....lb.	.25	.29	.24	.29	.24	.27
Dichlorobenzene, wks.....lb.	.12½	.14	.12½	.14	.11	.17
Formaldehyde, drs, wks.....lb.		.22		.22	.21	.22
Nitroaniline, wks, kgs.....lb.	.41	.43	.41	.43	.41	.45
Nitrochlorobenzene, wks.....lb.		.15		.18		.18
Toluenesulfonamide, bbls.....lb.		.70		.70		.70
Toluidine, bbls, wks.....lb.		.44		.44		.48
Penicillin, ampules per						
100,000 units.....	.21		.38		.38	.95
Pentaerythritol, tech.....lb.	.32	.36	.27	.36	.27	.31

## PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks,						
East Coast.....gal.	.13		.13	.11½	.12½	
Naphtha, East						
tks, wks.....gal.	.11		.11	.11	.12	
Rubber solvents, East, tks,						
wks.....gal.	.12		.12	.11	.12	
Stoddard Solvents, East,						
tks, wks.....gal.	.11½		.12	.10	.12	
Phenol, U.S.P., drs.....lb.	.11½	.13½	.11½	.13½	.10½	.13½
Phthalic Anhydride, cl and lcl,						
wks.....lb.	.14½	.15½	.14½	.15½	.13	.15½
Potash, Caustics, 88-92%,						
wks, sol.....lb.	.06½	.07½	.06½	.07½	.06½	.06½
Flake, 88-92%.....lb.	.07½	.08½	.07	.08½	.07	.07½
liquid, 45% basis, tks.....lb.	.03½	.04	.03½	.04	.03	.03½
Carbonate, hydrated						
83-85%, bbls.....lb.	.05½	.05½	.05½	.05½	.05½	.05½
Chlorate crys, kgs, wks.....lb.	.08½	.09½	.08½	.13	.11	.13
Chloride, crys, tech, bgs,						
kgs.....lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks.....lb.	.55	.55	.55	.55	.55	.55
Iodide, drs.....lb.	1.75	1.78	1.44	1.78	1.44	1.48
Muriate dom, 60-62-63%						
K <sub>2</sub> O bulk unit-ton.....	.53½		.53½	.53½	.56½	
Permanganate, USP, wks						
drs.....lb.	.22½	.23	.20½	.23	.20½	.21
Sulfate, 90%, basis, bgs, ton	36.25	39.25	36.25	39.25	36.25	39.25
Propane, group 3, tks.....gal.	.03½	.03½	.03½	.03½	.03½	.03½
Pyridine, ref., drs.....lb.	.55	.55½	.55	.55½	.45	.55½
R Salt, 250 lb. bbls, wks.....lb.	.72		.72		.65	
Resorcinol, tech, drs, wks.....lb.	.68	.64	.74	.64	.74	
Rochelle Salt, cryst.....lb.	.34½	.35	.34½	.35	.34½	.47
Salt Cake, dom, blk wks.....ton	20.00	26.00		26.00		15.00
Saltpeter, grn. bbls.....100 lbs.	9.00	9.50	8.20	9.50	8.20	9.00

! Producers of natural methanol divided into two groups and prices vary for these two divisions; m Country is divided into 4 zones, prices varying by zone. Spot price is ½c higher.

## Current Prices

## Oils & Fats Shellac

	Current		1947		1946	
	Low	High	Low	High	Low	High
Shellac, blchd. bone dry, bbls. .... lb.	.65	.68½	.65	.74½	.42½	.74½
Silver Nitrate, bota, 2,500-oz. lots. .... oz.	.49½	.50½	.49½	.59	.47	.59
Soda Ash, 58% dense, bgs, c-l, wks. .... 100 lbs.	....	1.28	....	1.28	....	1.28
58% light, bgs cl. .... 100 lbs.	....	1.20	....	1.20	1.05	1.20
Caustic, 76% flake drs, cl. .... 100 lbs.	2.90	3.00	2.90	3.00	....	3.00
76% solid, drs, cl. .... 100 lbs.	2.50	2.75	2.50	2.75	....	2.75
Liquid, 47-49% sellers, tks. .... 100 lbs.	....	2.10	....	2.10	....	2.10
Sodium Acetate, anhyd, drs. .... lb.	.06½	.10	.06½	.10	.08½	.10
Benzoate, USP drs. .... lb.	.46	.52	.46	.52	.46	.52
Bicarb, USP, gran., bgs, cl., wks. .... 100 lbs.	2.25	2.59	2.25	2.59	1.55	2.59
Bichromate, bgs, wks l.c.l. lb.	.08½	.08½	.07½	.08½	.07½	.08½
Bisulfate powd, bbls, wks. .... 100 lbs.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks. .... 100 lbs.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c-l. .... lb.	....	.06½	....	.06½	....	.06½
Cyanide, 96-98%, drs. .... lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, drs. .... lb.	.09½	.10	.07½	.10	.07½	.08½
Hyposulfite, cryst, bgs, cl, wks. .... 100 lbs.	....	2.75	....	2.75	....	2.25
Metasilicate, gran, bbl, wks c-l. .... 100 lbs.	....	3.40	....	3.40	....	3.40
Nitrate, imp, bgs. .... ton	41.50	....	41.50	33.00	38.50	....
Nitrite, 96-98% bbl, cl. .... lb.	....	.06½	....	.06½	....	.06½
Phosphate, dianhyd, bgs, wks. .... 100 lbs.	6.25	7.00	6.00	7.00	6.00	6.75
Tri-bgs, cryst, wks. .... 100 lbs.	3.50	3.90	2.70	3.90	2.70	3.10
Prussiate, yel, bbls, wks. .... lb.	....	.12½	....	.12½	....	.11
Silicate, 52°, drs, wks. .... 100 lbs.	1.55	2.00	1.40	2.00	1.40	1.80
40°, drs, wks, c-l. .... 100 lbs.	.95	1.15	....	1.15	....	.80
Silicofluoride, bbls, NY. .... lb.	.07½	.08½	.06½	.08½	.06½	.10
Sulfate tech, Anhyd, bgs. .... 100 lbs.	2.10	2.60	1.70	2.60	1.70	2.20
Sulfide, cryst c-l, bbls, wks. .... 100 lbs.	....	2.90	....	2.90	....	2.40
Solid, bbls, wks. .... lb.	3.05	4.50	3.05	4.50	3.15	3.90
Starch, Corn, Pearl, bgs. .... 100 lbs.	4.99	5.12	4.99	5.27	4.321	6.271
Potato, bgs, cl. .... lb.	.08½	.09	.0735	.09	.0735	.0760
Rice, bgs. .... lb.	no stocks	no stocks	no stocks	no stocks	no stocks	no stocks
Sweet Potato, bgs. .... lb.	no stocks	no stocks	no stocks	no stocks	no stocks	no stocks
Sulfur, crude, mines. .... ton	....	16.00	....	16.00	....	16.00
Flour, USP, precp, bbls, kgs. .... lb.	.18	.30	.18	.36	.18	.36
Roll, bbls. .... 100 lbs.	2.65	3.40	2.65	3.40	2.40	3.40
Sulfur Dioxide, liquid, cyl. .... lb.	....	.085	.07	.085	.07	.08
tks, wks. .... lb.	....	.044	....	.044	....	.04
Talc, crude, c-l, NY. .... ton	....	15.00	....	15.50	....	15.50
Ref'd, c-l, NY. .... ton	14.50	24.50	14.50	24.50	13.00	21.00
Tin, crystals, bbls, wks. .... lb.	....	.55	....	.55	no stocks	....
Metal. .... lb.	....	.80	....	.80	....	.70
Toluol, drs, wks. .... gal.	....	.28	....	.28	.27	.32
tks, frt all'd. .... gal.	....	.23	....	.23	.22	.27
Tributyl Phosphate, drs, lcl, frt all'd. .... lb.	....	.72	....	.72	....	.65
Trichloroethylene, drs, wks. .... lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks. .... lb.	....	.32	....	.32	....	.32
Triethylene glycol, drs. .... lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos., bbls. .... lb.	.26	.27	.26	.32	.26	.32
Urea, pure, cases. .... lb.	....	.12	....	.12	....	.12
Wax, Bayberry, bgs. .... lb.	no stocks	no stocks	no stocks	no stocks	no stocks	no stocks
Bees, bleached, cakes. .... lb.	.70	.71	.68	.71	.60	.70
Candelilla, bgs, crude. .... lb.	.76	.77	.77	.80	.62	.86
Carnauba No. 1, yellow, bgs, ton. .... lb.	1.52	1.55	1.52	2.00	1.80	2.04
Xylol, Indus., frt all'd, tks, wks. .... gal.	....	.23	....	.23	....	.26
Zinc Chloride tech, fused, wks. .... lb.	.06½	.0655	.05	.0655	.05	.0535
Oxide, Amer., bgs, wks. .... lb.	.095	.0975	.09	.09½	.07	.09½
Sulfate, crys, bgs. .... 100 lbs.	4.15	4.90	3.40	4.90	3.40	4.15

## OILS AND FATS

Babassu, tks. .... lb.	no prices	no prices	.11	.12
Castor, No. 3, drs, c-l. .... lb.	.32½	.34½	.34½	.29½
China Wood, drs, spot NY. .... lb.	.30	nom.	.30	.41
Coconut, edible, drs NY. .... lb.	no prices	no prices	....	.0985
Cod, USP, bbls, drs. .... gal.	2.60	3.70	2.60	3.80
Corn, crude, tks, wks. .... lb.	....	.23½	.27	.37
Linseed, Raw, drs, c-l. .... lb.	.39	nom.	.3580	.3960
Menhaden, crude tks. .... lb.	no prices	.23	nom.	.1220
Light, pressed, drs l.c.l. .... lb.	....	.27	....	.1300
Palm, Niger, dms. .... lb.	no prices	no prices	....	.0865
Peanut, crude, tks, f.o.b. wks. lb.	.25	nom.	.25	.37
Perilla, crude, dms, NY. .... lb.	no stocks	no stocks	no stocks	....
Rapeseed, bulks. .... lb.	no prices	no prices	....	.13
Red, dms. .... lb.	.21½	.25½	.21½	.33½
Soy Bean, crude, tks, wks. .... lb.	.22	.23	.22	.33
Tallow, acidless, dms. .... lb.	.23½	nom	.32½	.34½

Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y., refined 6c higher in each case.

Versatile chemical with many uses for  
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• PROCESSING SHORT-CUTS

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The more important applications of this Red Prussiate of Potash include its use in blueprints, calico printing, paper manufacture, synthetic rubber, photographic bleach, pigments, tempering of steel, analytical chemistry, and as a mild oxidizing agent.

The properties and characteristics described below may suggest new ideas and applications of this versatile chemical. Your inquiry is invited, HUNT'S Technical Service can help solve your problems.

Mol. Wgt. 329.18  
Ferrous Salts trace  
Sulphates 0.009%  
Chlorides 0.024%  
Assay 98.0 to 99.3%  
Insolubles trace

Available in Powder, Granular, and Crystalline forms.  
Color is Ruby Red.  
IMMEDIATE DELIVERY

## HUNT CHEMICAL WORKS, INC.

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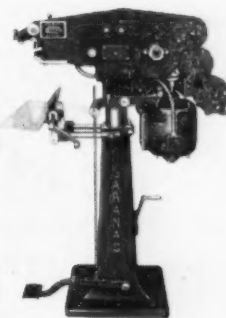
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when sealed on the D-10"



Paper bags can be securely, economically, almost hermetically sealed on the Model D-10" Standard Bag Sealer. Folding and stapling operations are automatically performed at a single stroke.

The resultant stapled fold is the strongest part of the bag—and it's siftproof. Bulletin 154-C67 contains detailed information about bag sealing machines and about our inexpensive licensing plan.



Saranac Standard Model D-10

★ SARANAC MACHINE CO. ★  
BENTON HARBOR, MICHIGAN.

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## MULTIWAX

White - Yellow - Amber - Dark

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NEW YORK 17, N. Y.

PLaza 8-2644







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**IMPORTERS and EXPORTERS**

**MACHINERY  
and  
EQUIPMENT FOR SALE**

- 3—Baker-Perkins heavy duty Jack. Mixers, 100, 20 and 9 gals.
- 2—Devine #3 Vac. Shelf Dryers
- 10—Sperry 32" sq. Iron Filter Presses
- 11—Sharples No. 5A Centrifuges, Stainless Steel Bowls, late type, motor driven.
- 2—Stokes RD4 Rotary Tablet Machines 1 3/16"
- 1—Colton #2 Rotary Tablet Machine 5/8"
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- 4—Rotex Sifters 20" x 81", 3 decks.
- 1—Christie 80"x45" Rotary Dryer
- 1—Oliver Rotary Vacuum Filter 8' x 10'.
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- 2—Dorr 15" Bowl Classifiers
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- 20—Portable Elec. Mixers, 1/4 to 2 H.P.
- 4—Pfaudler Glass-lined Jack. Kettles, 350, 400 and 500 gals.
- 15—Stainless Steel Jack. Kettles, 40, 60, 80, and 375 gals., and up to 3000 gals.
- 25—Copper, Alum. and Steel Kettles to 1500 gals.
- 20—Stainless Steel Tanks, 100 to 3000 gals.
- 75—18", 30" and 36" sq. Iron Filter Press Plates and Frames

Hammer Mills, Grinders, Crushers, Mixers, Stills, Hydraulic Presses, Pumps, Accumulators, etc.

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- 1—Size 18, Ross Pulverizer.
- 1—Centrifugal Extractor.

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6000 to 12,000 Gallons  
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**FIRST FACTS**  
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WITH FIRST MACHINERY**

**AUTOCLAVES**

- 1 6' x 20' with quick opening doors, 100 P.S.I.
- 1 Impregnator, fumigator or pressure tunnel, 7' x 7' x 50' with rails, vacuum pump and accessories.
- 1 Vertical, 4' x 7' 6", forge welded steel, 900 lbs. pressure.
- 1 Vertical, 42" x 24' 4", forge welded steel, 600 lbs. pressure.
- 2 Jacketed autoclaves, 3' x 12', 5/8" shell, 100 P.S.I.

**COLLOID MILLS AND HOMOGENIZERS**

- 7 Eppenbach Colloid Mills, Vertical and horizontal types, some in stainless steel, from 1/2 HP to 5 HP
- 2 Premier Mills, 5 HP and 40 HP
- 4 Charlotte (Chem-Colloid) from 1 HP to 50 HP
- 10 Mantol Gaulin, in stainless or bronze, from 1/2 HP to 20 HP
- 3 Marco Homogenizers, 7 1/2 HP and 10 HP
- 6 Cherry Burrell, Union, Hurrell, York, in Stainless, and Bronze, up to 40 HP

**COLUMNS**

Distillation Columns from 6" to 84" Diameter, Copper, Steel, Monel

**DRYERS**

- 1 Louisville Steam Tube Dryer, 54" dia. x 30' long
- 1 Louisville Dryer 6' x 39', lined with non-corrosive metal
- 1 Truck Dryer, 12' long, 6' wide, 7' high, with 4 trucks
- 8 Devine, Stokes and Buffalo Vacuum Shelf Dryers, from Laboratory size to Double Door 60" x 160", twenty shelf large production unit; some complete with all accessories.
- 1 Apron type single pass conveyor dryer, 18" x 23', motorized
- 1 Proctor & Schwartz Two Pass Apron Type Soap Dryer, 40' long, 15" wide
- 1 Double drum dryer, Black and Clawson, 30" x 60", with accessories
- 1 Christie Dryer, 70" x 40' long
- 1 Proctor and Schwartz steam heated tray dryer, capacity—80 trays, 10" x 5", complete with accessories
- 7 Rotary Dryers, from 3' x 30' to 6' x 64'
- 3 Drum dryers or flakers, 4' x 9', 4' x 12' and 3' x 6', with accessories
- 1 Devine rotary vacuum dryer, 5' x 33', with 35 HP motor and accessories.

**EVAPORATORS**

- 1 Quadruple Effect Steel Evaporator, 60,000 lbs. water per hour
- 1 Blaw Knox triple effect evaporator, horizontal type, 6' x 9', all steel
- 3 Buffalo triple effect evaporators, 600 to 1200 sq. ft.
- 1 10' copper vacuum pan, calandria type
- 1 Swenson single effect cast aluminum
- 1 Zaremba cast iron single effect, 10' diameter x 12' high, 200 gallon holding capacity, copper tubes, complete with vacuum pump and condenser

**EXTRACTORS**

- 19 Centrifugal Extractors, various types from 20" to 48", some with iron, copper, rubber lined baskets and curbs, some with unloaders, plows, two speed motors, etc. State exact requirements.

**EXTRUDERS**

- 2 Allen 6" and 10" Extruder-Strainers.

**FILLERS**

- 3 Haller Rotary for juices, 7, 14 and 18 spout
- 4 Filler Machine Co. fillers, stainless, 3 to 11 Pistons
- Buffalo and Vol-U-Meter can fillers
- FMC Straight Line and Rotary Syphon Fillers
- FMC Straight Line Stainless Vacuum Fillers ready for immediate shipment
- Samco, Pneumatic Seale and Kiefer Cinati Rebuilt Vacuum Fillers
- 2 Stokes 32 hole Capsul Fillers in good condition
- Stokes No. 79-80 A Tube Filler, Closer, Crimper in Stainless
- 3 Ayers No. 3 Tablet Counters and Fillers

**FILLERS FOR DRY POWDERS**

Stokes, Stokes and Smith, National Packaging, Tri-angle, Edtbauer, J. H. Day, Howes, Sprout-Waldron, etc.

NO. 6 OF A SERIES

**Man doesn't make the most permanent ink!**

It comes from a bag in a cuttlefish and is called sepia. The cuttlefish darkens the water all about him with this fluid when he wants to hide.

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Shriver, Sperry and Johnson Plate and Frame as well as recessed Presses, from 12" to 42", in Cast Iron, Aluminum, Lead, Wood, etc.  
Oliver United, Sweetland, Bower, Alsop, Industrial and other Standard Make Filters... state requirements, preferred make, capacity for quick quotations.

**KETTLES**

- 14 Steel and Cast Iron jacketed and agitated Kettles, from 100 gallon to 2400 gallon
- Copper, Steel, stainless, jacketed; some agitated.
- New Stainless Kettles, all sizes; prompt shipment

**LABELLERS**

- 8 Burt, Standard Knapp or Kyer all around Labellers, for cans, glass, etc.
- 4 New Jersey Labelrites
- 2 Straight Line fully automatic Labellers, Pneumatic and Weeks-MacDonald
- 8 World and Ermold semi-automatic Labellers for spot labelling

**MILLS**

- 4 Rubber Mills, 36", 48" and 60", with motors
- 1 Simpson Intensive Mixer, No. 2 with 6" Bowl
- 2 Lancaster Muller Type Mixers with 30" and 6" Bowls
- 6 Mikro Pulverizers, No. 1, No. 2 and No. 4.
- 20 Fitzpatrick, stainless, Model "D" Comminuting Machines
- 8 Raymond mills, Nos. "00," "0000," 45, 1, others
- 2 Jay Bee, No. 12 mills
- 1 Lehman 5 roll finisher or roller mill, 18" x 48"
- 6 Stedman, Gruendler, Williams hammermills
- 5 Allis Chalmers and Stearns Rogers tube mills, 5' x 22"
- 2 Red Mills, 5' x 10', 6' x 14'
- 1 Porter jacketed mill, 5' x 5'
- Abbe, Patterson and other Pebble and Ball Mills... state needs
- Large Selection of Roller Mills, 3, 4 and 5 rolls, 12" x 30", 16" x 40" and others of J. H. Day, Ross, Kent, Lehmann and others

**MIXERS**

- 1 Readco 150 gal. Stainless Clad double sigma arms, steam jktd., with vac. cover, 60 HP explosion motor
- 12 Read Jktd. Mixers, with double ribbon agitators, 33" x 34" x 72". Prompt shipment all sizes ribbon type, horizontal, all steel mixers
- 2 Patterson horizontal double ribbon, 30" x 40" x 84"
- 2 Heavy Duty, jacketed, 9 gallon, double arm, double gear Dough Type Mixers, single or double arms, jacketed or unjacketed from one BBL. to six BBL. Mixing Tanks and Kettles in steel, stainless, copper, etc.

**MISCELLANEOUS**

- 1 Waldron Five Color Textile Printing Press for goods up to 31" in good operating condition
- 6 Coating Pans in copper from 20" to 38" diameter
- 8 Large Horizontal Copper Storage Tanks from 1000 to 8000 gal.
- 3 Kiefer 72 spout Rotary Rinsers
- 4 Vacuum Pans or Stills in Copper, Aluminum and Glass Lined, some with agitators from 50 gal. to 3000 gal.

**PACKAGING EQUIPMENT**

- Several complete lines for automatic filling of powders or liquids including sealers, cappers, labellers, etc.
- 2 Compression Belts or Sealers: 8" and 12" long
- 7 Ferguson and Standard-Knapp Aut. Cartons Gluers and Sealers

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Hydraulic Presses for Plastics, Laminating, Metal Powder Compression, etc. by H. P. M., Dunning and Boschert, Southwark, Bethlehem, Thropp, Elmes, Birdsboro, Stokes, etc. State your requirements. Cider Presses in several capacities

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- Stokes and Barnstead water stills, gas or steam operated, from 2 to 300 GPH
- 8 Distillation or Fractionating Columns, copper, 18" to 62" diameter

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- 35 Stokes and Colton Tableting Presses, single punch and rotary presses.

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Vacuum Pans with and without heavy duty Agitators, sizes 20", 3', 4', 5', 6'.

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3 New Mikro Pulverizers; 1 SH, 2 Mikro 4TH 24" Machines.

Tolhurst 26" Centrifuges, Crescent Morris 40" Basket Centrifuge.

Day, Lehman 12" x 30" Roller Mills, Kent 9" x 24", Soap Mills, N. E. Heavy Duty Types.

Shriver, Oliver Sweetland, Johnson Filter Presses. Write detailed requirements.

Mullers and Sizers 4', 6', and 9' sizes.

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1—Read Vertical Stainless Steel Mixer, 100 gals., 5 HP Motor.

1—Stainless Steel Jacketed Kettle, 5' x 6'.

1—Stainless Steel Still, 40 gals.

2—Pfaudler Stainless Steel Jacketed Tanks, 13,500 gals.

2—Stokes Jacketed Vacuum Mixers, 8 gals., 1 HP Motor; 75 gals., 3 HP Motor.

1—Louisville Rotary Steam Tube Dryer, 6' x 50'.

15—Sharples Super Pressure Centrifuges, 3 HP Explosion-Proof Motors.

2—Shriver Cast Iron Plate & Frame Filter Presses, 42" x 42", 64 chambers.

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**UNION, N. J.**  
Est. 1886 Unionville 2-4900

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8—New Ingersoll-Rand 6" x 5" pumps, 1000 GPM, directly connected to 7 1/2 HP TE motors.

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1 Kiefer 72-stem Rotary Bottle Rinser

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1 42" diameter, 37 plate, all copper alcohol Rectifying Column, with dephlegmator, condenser and 12,000 gallon steel still pot.

2 Steam heated Copper Pot Stills, approximately 8,360 gallons, complete with vapor piping and condensers.

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2 Nordyke Cylinder Separating Reels, 2'8"x8'.

1 Bron Dust Reel No. 2—36"

1 Dust Collector, sack type, Prinz and Rou.

1 Richardson 125 lb. Baggage Scale, J-55.

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6—Stokes Rotary Tablet Machines, Model RD-4.

6—New Clevon Can Filling Machines.

### SPECIAL

New Dry Powder Mixer, ribbon type, 8 cu. ft. and 24 cu. ft.

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- 12—Stainless Steel Kettles, 60-500 gals.
- 10—Stainless Steel Tanks, 100-500 gal.
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- 1—5' All Copper Evap., 500 sq. ft.

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100—Box & Gondola Cars.  
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8—3 x 4 and 4 x 7 Hummer Screens.  
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5' x 33' Steam Jacketed Vacuum Dryer.  
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14—10,000, 15,000, 20,000 and 26,000 gal. Cap. Horizontal and Vertical.  
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**BOILER**—Upright, 10 HP, tubes excellent.  
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New, Brown 12 Station Potentiometer with Thermo-couples.  
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Sellers 14 Burner Gas-fired Hot Air Oven Heater.  
Sellers 10 Burner, Gas-fired Hot Air Oven Heater.  
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Miscellaneous Items, including Compressors, Pumps, Weighing Machines, Union Special #14500D Sewing Machines, etc.

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**1—Steel Tube Condenser, approximately 2' x 20', with Calorized steel tubes.**

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- 2—STOKES Rotary DD2 Tablet Machines, 5 HP. Motors.

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**4—Fletcher 40" solid stainless steel Basket CENTRIFUGALS**, direct motor driven with two speed motors with skimmers and unloading plows.

**1—Buffalo Atmospheric DOUBLE DRUM DRYER**, 42" x 100".

### MISCELLANEOUS

Motor Driven Bronze Pumps, Instruments, Dial Scales, Copper Pipe, Speed Reducers, Pulverizers, Portable Agitators with Explosion Proof Motors.

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**1—No. 10 Sweetland**, 52 brass leaves.

**5—Sperry**, 36" x 36", iron, center feed, 61 plates, each with motor driven hydraulic closing mechanism.

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**1—Johnson** 36" x 36", iron, center feed, 44 plates, double end, gear closing device.

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**3—5 x 33 J.P. Devine ROTARY VACUUM DRYERS**, welded jackets, roller bearings, speed reducer drive.

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PURCHASING AGENT—We need a man who knows his way around in the chemical field. Must produce immediate results in buying raw materials in a somewhat specialized field. Must know sources and suppliers of synthetic organic chemicals. If you know the field from A to Z, are neither too young nor too old, want a good future in congenial surroundings, write full details, in confidence. Box 4035, 522 Fifth Avenue, New York 18, N. Y.

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# EMULSION PAINTS

(Continued from page 951)

be produced; only then will it become possible to take full advantage of their outstanding properties.

A key factor in the manufacture of good emulsions is, without any doubt, the emulsifying agent. The number of technically valuable synthetic emulsifiers is growing steadily. Whereas two decades ago only a few agents, mostly of natural origin, were available, a recent compilation enumerates close to two hundred well defined emulsifiers. Many of these agents are specially designed for one particular sort of emulsion and by using them properly, emulsions can be prepared which are truly satisfactory.

With regard to the future only two aspects of emulsions will be mentioned. An increasing number of synthetic raw materials will be manufactured by emulsion polymerization, that is, instead of polymerizing monomers in mass, the monomer is first dispersed in an aqueous phase and the polymerization carried out in emulsion. This process has proved highly satisfactory in different respects. It yields, of course, the finished product in emulsified form; consequently, it is much more economical to use it, wherever possible, as such, instead of first preparing the pure polymer and re-dispersing afterwards. Accordingly the formulator of coatings will have to seriously consider using the new polymers as they come from the polymerization plant, i.e., in the form of emulsions.

Another point with future possibilities is this: in all previous discussions it was tacitly assumed that the main constituent of the water phase must be water. This, however, is not so. Just as the term "oil" can mean anything of oil-like character, provided that it is immiscible with water, the term "water" can mean anything of water character, provided that it is immiscible with oil. Though at present, to the author's knowledge, waterless emulsions are not technically employed, they can be made and they offer interesting possibilities. It is not too difficult to visualize O/W or W/O emulsions in which the water is replaced by certain polar liquids, such as ethyl or isopropyl alcohol or some polyvalent alcohols or ethers, and advantage is taken of those of their properties in which they are different from water—for instance, their lower freezing point, or their solvent power for numerous compounds which cannot be dissolved in water.

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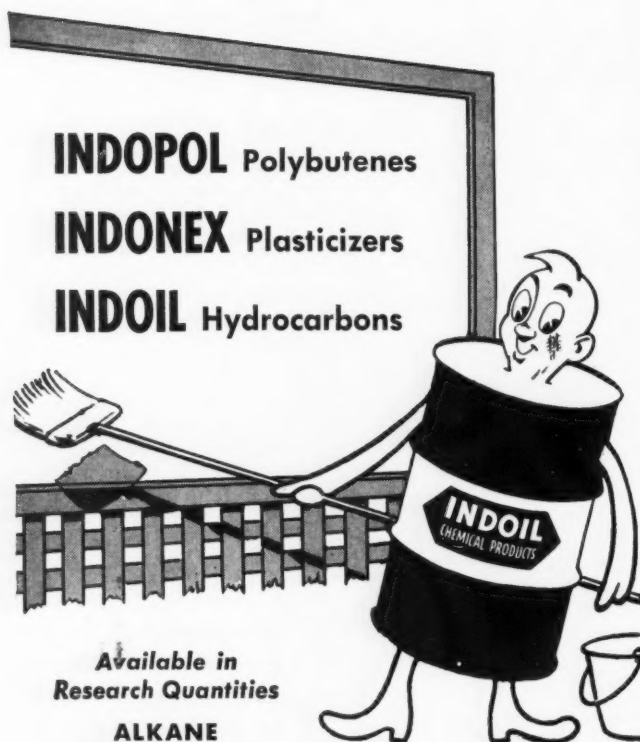
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WE HAVE NEVER been able to figure out whether women use cosmetics primarily to blandish us of the rugged sex or to appear decent in the eyes of their feminine friends. Be that as it may, we were staggered (and flattered) to learn, from WPB figures, what great quantities of "essential" cosmetics were used daily by American women—and incidentally, how large a market for chemicals the cosmetic industry provides. Here's the daily quota of "attractivators": 25 tons of cold cream, a ton of lipstick, half a ton of rouge, a tankcar of hand lotion, 65 tons of powder, 75,000 quarts of shampoo, and 10 barrels of perfume.



HAVE YOU ACQUIRED the habit of eating benzedrine inhalers? If so, and you live in Pennsylvania, you'd better watch out. We hear there's a bill before the state legislature which would make it illegal to sell inhalers unless the benzedrine is "denatured." With what?—we wonder. We hope we don't live to see the day when "benz fiends" succumb to the blind staggers, muttering, "I didn't know it was denatured."



WE HAVE BEEN mildly curious while listening to our radio of late. What is 100 per cent ink? One ink-maker claims to sell such a product. If we understand correctly, ink is a mixture of this, that and the other plus water. Whatever this is, or that is, or the other is, and no matter in what proportions they are mixed and diluted, it seems to us as if the result might be called 100 per cent ink.

Now we'll cogitate on some simpler problem, like "What is 100 per cent after-shave lotion?"



DO YOU, BALDING EXECUTIVE, want something to hold that hair-line against further recession? Read the following patent and thank *The Percolator* for bringing it to light:

"HAIR TONIC. E. N. Sheldon, U. S. Patent 841,057, Jan. 8, 1907.

"This invention has for its object to provide a dressing, which when applied to the scalp and hair, will stimulate the former and promote the growth of the latter. The preparation embodies kerosene, asafetida, and naphthalene."

### FIFTEEN YEARS AGO

(From Our Files of June, 1932)

Senate inquiry of N. Y. Stock Exchange reveals that Sir Harry McGowan, I. C. I., and Percy A. Rockefeller, Air Reduction director, profit to the extent of \$58,000 and \$46,673 in connection with a pool in Radio stock.

Frank G. Breyer reports that \$15,000 is urgently needed for chemists' unemployment fund . . . Aluminum Co. of America announces a general 10 per cent salary and wage cut . . . American Smelting & Refining Co. closes its smelter at El Paso for two months.

### THIRTY YEARS AGO

(From Our Files of June, 1917)

Plans are laid for the 3rd National Exposition of the Chemical Industries . . . Du Pont announces its entrance into coal-tar dye field.

The Bayer Co., Inc., starts suit against United Drug Co. for infringement of its trade-mark, "Aspirin." Bayer contends that the trade mark is still valid, even though process patents have expired.

IT IS OFTEN SAID that application of the "scientific method" to political, economic and social problems would go a long way towards bringing sweet reasonableness out of chaos. We wonder. We've been following the letters to the editor of one of the higher-brow scientific journals and have learned that able scientists, looking at the same facts in their own special field—biology, in this case, can become quite hyperthyroid and vituperative in their disagreement. Can we expect concord in areas where the facts are even less patent and possible interpretations of them even more diverse?



IT HAS JUST occurred to us that the plastics industry has contributed to the growing delinquency of minors. If they sit down in some abandoned garage for a "friendly little game" they use plastic cards and plastic chips; or if they go out in the alley, they throw plastic dice. Suppose they succumb to the evil weed. They probably use a plastic cigarette case or show off with a plastic holder. Worse still, if they turn to drink, they rip off a plastic seal covering the cork.

The plastics industry should retribute for its sins: What this country needs is a cheap, stout plastic paddle.



JET PILOT (see below) was backed both by an ink chemist and a pilot-plant engineer. A safety engineer liked Faultless.



What weighty radio program was absorbing the attention of these chemists—including a former ACS president, with his back to the camera—at the Columbus Polymer Symposium last May 3? A speech by Molotov? A panel discussion of atomic control? Wrong both times: It happens to be the running of the Derby!

# NEUTRONYX 330

**Non-Ionic • Surface-Active  
DETERGENT and EMULSIFIER  
with  
Unusual Dispersing Action**

**N**eutronyx 330 is a typical example of the Neutronyx Series of non-ionic surface-active agents. The Series includes five materials, all with exceptional usefulness in detergent, emulsifying and dispersing action with the outstanding advantage of stability against hardness, electrolytes and both anionic and cationic surface-active agents. Each of these materials possesses unique combinations of surface-active characteristics, so that for a given application it is desirable to evaluate each one in order to determine the best balance of properties for a specific application. Each Neutronyx material is an excellent wetting agent in warm solutions.

## PERFORMANCE

Surface Tension (Dynes per Cm.)  
DuNouy Tensiometer (25°C.)

Concentration	Dynes
0.5%	34.5
0.1%	35.2
0.01%	35.4

Wetting Action (Draves Test)

Concentration	25°C.	60°C.
0.5%	215 Sec.	27 Sec.
0.2%	5 Min. Plus	56 Sec.
0.05%	"	170 Sec.

Detergency

Hunter Reflectometer with standard soiled cotton before and after washing.

Concentration	Per Cent
0.1%	13.5
0.05%	11.9

With addition of 0.25% TSPP

0.1%	22.8
0.05%	15.0

## PROPERTIES

Neutronyx 330 is a reddish brown oily liquid readily miscible with water and with alcohol. It contains over 95% of the active ingredient — a polyalkyl ether condensate of fatty acids.

It is compatible with moderate concentrations of acids and alkalies and with hard water, electrolytes and both anionic and cationic surface-active agents. It disperses insoluble anionic-cationic complexes. Soluble in both water and organic solvents.

It is stable to heat and has perfect stability in both normal plant use and in storage.

## POSSIBLE USES

- **EMULSIFYING AGENT** in manufacture of cosmetics, industrial cleaners, insecticides, and for the production of emulsifiable oils. Degreasing and fat liquoring in leather making.
- **SEQUESTERING AGENT** in manufacture of foam rubber.
- **DISPERSING AGENT** in making DDT dispersions. Particularly useful in dispersing heavy metal soaps and the insoluble complexes formed when anionic and cationic surface-active agents are mixed.
- **DETERGENT**, particularly in salt and hard waters. Used in organic solvents for removal of residual oils in cleaning airplane, automotive and other metal parts. Also used as a foaming and coupling agent.

**onyx**

CHEMICALS FOR INDUSTRY

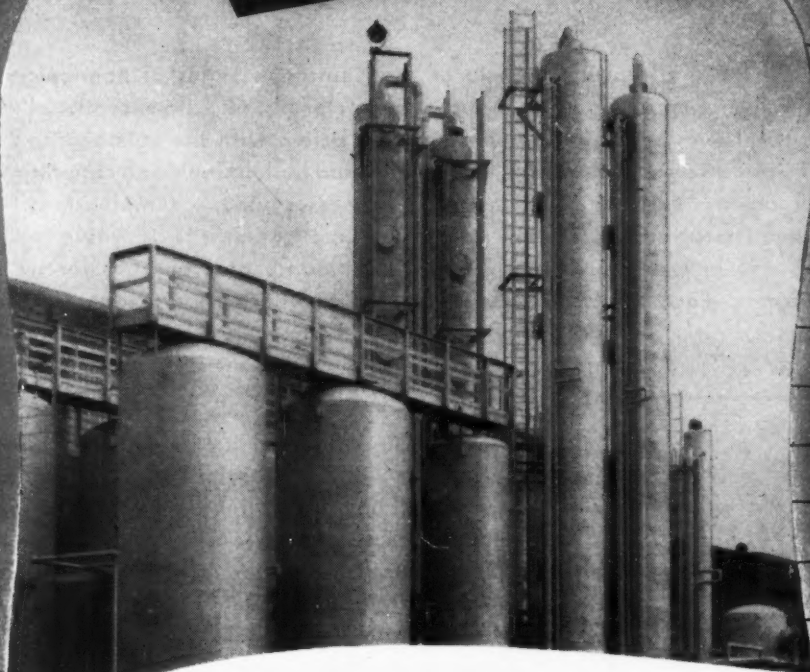
**Onyx Oil & Chemical Company**

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In Canada: Onyx Oil & Chemical Co., Ltd. Montreal, Toronto, St. Johns, Que.

# Devine PROCESS EQUIPMENT



Pressure Vessels  
Vacuum Vessels  
Fractionating  
Columns  
Digesters  
Autoclaves  
Heat Exchangers  
Dryers  
Carbonators  
Evaporators  
Still  
Condensers

**UNEXCELLED FACILITIES FOR THE  
FABRICATION OF CODE VESSELS**

Devine has a spacious modern plant, complete up-to-date equipment and 38 years of experience in the designing and building of plate-fabricated equipment for process industries. Facilities include annealing ovens of ample size for the largest vessels, and X-ray testing equipment for the application of ASME and API-ASME codes.

Devine facilities are at your service, whether for the designing of equipment to fit special needs, or the fabricating of equipment from your own or standard blueprints. No vessel is too large—size is restricted only by the limitations of transportation. A telegram or letter will bring a Devine representative.



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# Abstracts of U. S. and Foreign Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

Requests for further information or photostated copies of Canadian patents should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada.

U. S. Patents from Official Gazette—Vol. 595, Nos. 2, 3, 4—Vol. 596, No. 1. (February 11-March 4)  
Canadian Patents Granted and Published March 25—April 22, 1947.

## \*Metals, Ores

Apparatus comprising conveyor to move metal member continuously in direction of its length, desurfacing and resurfacing unit adjacent path of member, unit comprising oxygen desurfacer for thermochemically removing layer of surface metal from metal member, etc. No. 2,414,510. Edmund Doyle to The Linde Air Products Co.

Apparatus for continuously uniting separate flat metal members comprising desurfacing station, uniting station provided with pressure means and with blowpipe means for producing heating flame, etc. No. 2,414,511. Hugh Dyar to The Linde Air Products Co.

Beneficiating oxidized iron ores by froth flotation comprises subjecting ore to froth flotation in presence of effective amount of collector containing as its essential collecting constituent sulfonated saponifiable organic oil, etc. No. 2,414,714. Robert Booth and Earl Herkenhoff to American Cyanamid Co.

Beneficiation of beryllium ores comprises blunging comminuted water, with 4.6 pounds of 47% hydrofluoric acid per ton of ore for 30 minutes, washing treated ore with excess water, decanting slimes until ore pulp has pH of 7; admixing therewith per ton of ore 0.54 pound of oleic acid and 0.18 pound of pine oil, etc. No. 2,414,815. James Kennedy and Robert O'Meara to the Secretary of the Interior of the United States of America.

Metal coating apparatus comprising melting pan, furnace wall surrounding pan and combustion chamber around pan, roof for chamber, wall being provided with burner openings, floor of chamber having areas inclined downwardly toward pan, and heat baffle surrounding pan. No. 2,414,860. Harry Dobrin to Furnace Engineers, Inc.

Separating rhenium from flue dust obtained from roasting ores and like without preliminary or added oxidation. No. 2,414,965. Arthur Melaven and John Bacon to The University of Tennessee Research Corp.

Electrostatic separation of material particles. No. 2,414,993. Edwin Wiegand to Orefraction, Inc.

Electrode for arc welding with flux coating having analysis: SiO<sub>2</sub> 23 to 50%, Al<sub>2</sub>O<sub>3</sub> 0 to 5%, FeO from metallic iron 2 to 11%, FeO from iron compounds 14 to 25%, CO<sub>2</sub> from carbonate 8 to 17%, MnO from metallic manganese 22 to 49%, Na<sub>2</sub>O 1 to 4%. No. 2,415,149. Per Sjoman to Elektriska Svetsningsaktiebolaget.

Effecting electrodeposition of lead from acidic, aqueous lead electrodepositing solution in presence of .05 to 5.0 grams per liter of anthraquinone sulfonate and 1.0 to 5.0 grams per liter of sulfite cellulose waste. No. 2,415,169. Allen Gray to E. I. du Pont de Nemours & Co.

## Canadian

Extracting iron from titaniferous ores by dissolving in hydrochloric acid, heating the mixture between 70°C and the boiling point of said mixture and separating the undissolved residues from the iron-containing solution. No. 439,860. Canadian Titanium Pigments, Ltd. (Hugh Vincent Alessandrini and Borivoj Vincent Sterk).

Improved process for the recovery of magnesium as chloride from dolomite and a brine containing chlorides and sulphates of sodium and calcium. No. 440,012. The Consolidated Mining and Smelting Company of Canada, Ltd. (The Mathieson Alkali Works and Robert B. MacMullin).

## \*Organic

Ester of hydroxydihydronorpolycyclopentadiene and unsaturated monobasic carboxylic acid selected from aliphatic, cycloaliphatic, and arylaliphatic acids. No. 2,414,089. Herman Bruson to The Resinous Products & Chemical Co.

Manufacture of soap. No. 2,414,097. James Garvey, Arthur Garvey and Horace Garvey.

Production of fluorene and its nuclear substitution products comprises passing compound from group of orthomethylbiphenyl and its nuclear substitution products having nuclearhydrogen atom in ortho position. No. 2,414,118. Milton Orchin to the Secretary of the Interior of the United States of America.

Cyclic method of producing vanillic acid from vanillin, comprises adding one mole vanillin to boiling-hot aqueous solution containing one mole mercuric oxide and two moles of sodium hydroxide, etc. No. 2,414,119. Irwin Pearl to Cola Parker, as trustee.

Production of unpolymerized vanillyl alcohol, comprises reacting vanillin in presence of catalytic silver, with caustic alkali in presence of excess of caustic alkali and formaldehyde, conducted in presence of sufficient water to dissolve soluble reagents. No. 2,414,120. Irwin Pearl to Cola Parker, as trustee.

Stable, nonhygroscopic, solid sugar composition comprising sugars in discontinuous crystallized phase surrounded by plastic film containing invert sugars, non-sugar water-dispersible ash-forming solids, water, and small amount of pectin. No. 2,414,131. Alexander Zenzen.

Manufacture of hydroxylamine, comprises mixing liquid composition selected from aqueous and aqueous-alcoholic solutions and suspensions of

(Continued on page 1070)

\* U. S. Patents from Vol. 594, Nos. 2, 3, 4, Vol. 595, No. 1.  
Canadian from Feb. 25—March 18, 1947.

## Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

April 15, 1947

1,947,522. Process of Removing Fatty and Pitchy Matters from Animal Fibers and for Making Them More Readily Felt-able. Patented Feb. 20, 1934. Process for treating wool or other animal fibers for removing fatty matter therefrom to make them more readily feltable. Does not injure the fibers, particularly the interior thereof. Fibers are immersed in solvent of fatty matter (such as are well known in the art), which is chilled to a temperature below 0° C. at approximately atmospheric pressure or less. Solvent remains liquid at such temperature and is removed while maintaining a temperature of about 25° C. to 30° C. (Owner) Berta Fluss. Address correspondence to Oscar Fluss, No. 54 Elizabeth St., Baden near Vienna, Austria. Groups 22—31; 28—81.

April 22, 1947

The following patent, owned by the United States Government, as represented by the Secretary of the Interior, is available for licensing, upon a non-exclusive, royalty-free basis:

2,412,217. Froth Flotation of Chromite with Fluoride. Patented Dec. 10, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 75.) Process provides a good recovery of highgrade chromite concentrate with very low consumption of reagents. Process for the beneficiation of chromium ores comprises agitating and aerating an aqueous pulp of a comminuted chromite ore in the presence of a long-chain fatty acid having from 8 to 18 carbon atoms, a dispersing agent, and a soluble fluoride at a pulp acidity preferably between pH 2.5 and pH 4.5, and recovering a froth containing a chromite concentrate. Group 34—19. Reg. No. 5,465.

April 29, 1947

2,411,288. Froth Flotation with Simultaneous Filtration and Collection of Froth. Patented Nov. 19, 1946. A method and apparatus for separating concentrates from ores. The concentrates are recovered directly from the undiluted froth from the upper surface of the flotation cell and discharged into a bin. The pulp treated with flotation reagents in the usual manner is supplied to the flotation cell through pipe at side of tank. The froth is continuously produced at top of cell by motor driven agitators. The tailings are withdrawn through pipe on other side of tank. (Owner) Albert R. Morse. Address correspondence to Bosworth and Sessions, 1337 Guardian Bldg., Cleveland 14, Ohio. Group 35—33. Reg. No. 5,473.

May 6, 1947

2,261,406. Electrometallurgy. Patented Nov. 4, 1941. A process and apparatus for the purification and separation of metallic elements. Material is fed from hopper by a screw conveyor through pre-heating chamber to end of vertical shaft and discharged into furnace. This drives off impurities that are volatile at low temperature and which are removed by vacuum pump. An electrode in upper end of furnace forms a continuation of vertical shaft. Below this electrode is a second electrode within a crucible. The material falling in arc between electrodes is fused and vaporized. The metallic vapors are passed through conduit to the precipitation chambers. (Owner) John A. Orme, c/o Electronics, Inc., 915 Meridian Ave., South Pasadena, Calif. Group 36—19. Reg. No. 5,519.

The following patent, owned by the United States Government, as represented by the Secretary of the Interior, is available for licensing upon a non-exclusive, royalty-free basis:

2,412,217. Froth Flotation of Chromite with Fluoride. Patented Dec. 10, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.) Process provides a good recovery of highgrade chromite concentrate with very low consumption of reagents. Process for the beneficiation of chromium ores comprises agitating and aerating an aqueous pulp of a comminuted chromite ore in the presence of a long-chain fatty acid having from 8 to 18 carbon atoms, a dispersing agent, and a soluble fluoride at a pulp acidity preferably between pH 2.5 and pH 4.5, and recovering a froth containing a chromite concentrate. Group 34—19. Reg. No. 5,542.

- metal nitrites with equivalent amount of acid stronger than nitrous acid, subjecting solution of nitrous acid to action of hydrogen under superatmospheric pressure in presence of hydrogenation catalyst. No. 2,414,142. Henry Dreyfus; Claude Bonard, administrator of said Henry Dreyfus, deceased.
- Making isopropenylvinyl ether for use as inhalant anaesthetic, includes mixing KOH, mineral oil and 1-halogen-2(2-halogenethoxy) propane, heating mixture in ammonia atmosphere at between 150° and 250° C. collecting resulting distillate, washing, drying and distilling distillate, collecting fraction which distills between 54° C. and 57° C. No. 2,414,201. Amos Horney and Julius Shukys to Air Reduction Co., Inc.
- Activating olefin hydrocarbons in condensation reactions, comprises passing hydrocarbons through consolidated granular mass consisting of intimate mixture of catalyst granules and spacer granules. No. 2,414,206. Edwin Layng to The Polymerization Process Corp.
- Preparing dimethylurea comprises reduction of dimethylolurea by amalgamated zinc in commercial concentrated hydrochloric acid, thereby preventing decomposition or resinification of dimethylolurea. No. 2,414,211. Jacob Rosin, David Josephowitz and Samuel Josephowitz.
- Preparation of oil-soluble copper-nicotine compounds comprising reacting nicotine with normal cupric salt of soap-forming acid, by mixing nicotine and normal cupric salt together in proportion of not more than 1½ molecules of nicotine for each molecule of the cupric salt. No. 2,414,213. Claude Smith to the Secretary of Agriculture of the United States of America.
- Cardanyl ester of phosphoric acid. No. 2,414,263. Lebbeus Kemp, Jr., to The Texas Co.
- Condensation product of compound containing alkylene oxide ring and member from group consisting of melamine, a hydrocarbon substituted melamine containing 1 to 3 monovalent hydrocarbon substituents attached to amine nitrogen and octadecoxypropyl melamine. No. 2,414,289. Walter Ericks to American Cyanamid Co.
- Process of recovering cysteine, comprises hydrolyzing material containing cystine with aqueous solution of hydrochloric acid, adding metal selected from zinc, iron, and tin, neutralizing acid remaining in solution with solid alkaline earth compound, etc. No. 2,414,303. Donald Holloway and Harland Young to Industrial Patents Corp.
- Trifluoromethyl derivatives of vinyl aromatic compounds. No. 2,414,330. Mary Renoll to Monsanto Chemical Co.
- Preparation of 1-inositol by hydrolysis of phytates, improvement comprises carrying hydrolysis out by heating a phytate in presence of ammonium acid salt in aqueous solution having acidic reaction. No. 2,414,365. Milton Elkin and Carl Meadows to American Cyanamid Co.
- Metal phthalocyanines having amino- or nitro-phenyl groups attached to their aromatic nuclei by >O, >CO, or >SO<sub>2</sub>. No. 2,414,374. Norman Haddock, Alexander Parkinson and George Rowe to Imperial Chemical Industries, Ltd.
- Hydroxylation of unsaturated organic compounds containing alcohol or ether group. No. 2,414,385. Nicholas Milas to Research Corp.
- Producing beta-aminopropionic acid, comprises reacting hydroxylic acid with aqueous ammonia at 120° C. to 225° C. No. 2,414,389. Joseph Paden to American Cyanamid Co.
- Process of preparing nitriles. No. 2,414,393. Ralph Potts to Armour & Co.
- Halogenated phenacylpyridines and process of preparing. No. 2,414,398. James Smith, Jr., to American Cyanamid Co.
- Purifying furfural contaminated with foam-producing substances contained in mixtures of low boiling aliphatic hydrocarbons, which have been extracted together with unsaturated hydrocarbons by furfural. No. 2,414,402. George Thodos and Charles Weinaug to Phillips Petroleum Co.
- Preparing aminobenzenesulfonamides comprises reacting imide-substituted-benzenesulfonyl halide with primary amine, heating reaction product with hydrazine hydrate. No. 2,414,403. Robert Winterbottom to American Cyanamid Co.
- Purifying chloracetophenone containing impurities including small percentage of hydrogen chloride and acetophenone, comprising treating chloracetophenone with organic treatment-medium selected from paraffin and olefin hydrocarbons having boiling point below 137° C. No. 2,414,418. William Lofton, Jr., to Pennsylvania Coal Products Co.
- Chemical compound obtainable from liver oils which has formula C<sub>18</sub>H<sub>34</sub>(OH)<sub>2</sub>, etc. No. 2,414,458. Norris Embree and Edgar Shantz.
- Preparing reaction product over period of time involving use of solution of Grignard reagent in ether. No. 2,414,505. Clyde Arntzen to Westinghouse Electric Corp.
- Producing pyrazines comprises vaporizing material selected from dialkylene triamines, 2-hydroxyethyl ethylene diamine, their C-alkyl substituted homologs, the volatilizable salts thereof and mixtures of same, passing vapors over dehydrogenation catalyst. No. 2,414,552. Harry Pfann and James Dixon to American Cyanamid Co.
- Preparation of pentaerythritol comprises reacting formaldehyde and acetaldehyde in aqueous medium in presence of hydroxide of alkaline-earth metal. No. 2,414,576. Joseph Wyler to Trojan Powder Co.
- Removing color from acrylic ester made by pyrolyzing corresponding ester of alpha-acetoxypropionic acid, comprising heating colored acrylic ester in presence of metal above hydrogen in electromotive series. No. 2,414,589. Martin Fein and Charles Fisher to the Secretary of Agriculture of the United States of America.
- Preparing unsaturated nitro compounds which comprises vaporizing a beta-ester of nitro alcohol of formula described in patent. No. 2,414,594. Marvin Gold to The Visking Corp.
- Preparing unsaturated nitro compounds comprises vaporizing beta-halo nitro alkane, subjecting the resulting vapors to temperature to pyrolytically cleave beta-halo nitro alkane into halogen acid corresponding to halo group and nitro olefin. No. 2,414,595. Marvin Gold to The Visking Corp.
- Production of thiophene comprises heating to within 300 to 500° C. material selected from alkyl sulfides and alkyl mercaptans together with sulfur. No. 2,414,631. James Boyd, Jr., and Cary Wagner to Phillips Petroleum Co.
- Concentrating diolefin having more than 2 and less than 6 carbon atoms in molecule contained in mixture thereof with mono-olefin possessing vapor pressure of same order of magnitude, comprises distilling mixture in presence of methylamine. No. 2,414,639. William Engs and Simon Wik and Robert Roberts to Shell Development Co.
- Production of partially water soluble cycloalkanol, containing single ring of not more than six carbon atoms, which forms with water azeotropic mixture containing greater proportion of water than is soluble in cycloalkanol at temperature lower than boiling point of azeotrope by hydration of corresponding cycloalkene. No. 2,414,646. Harold Hepp to Phillips Petroleum Co.
- Polyhydroxy-n-alkyl mono-bismuthate. No. 2,414,650. Rudolph Kuever and Larry Wheeler to the State of Iowa for the use and benefit of the State University of Iowa.
- Recovering cyclopentadiene in form of dicyclopentadiene from aromatic oil mixture containing dicyclopentadiene in admixture with monocyclic aromatic hydrocarbon and aliphatic conjugated pentadiene. No. 2,414,651. John Latham, Jr., to Phillips Petroleum Co.
- Manufacture of cyanuric chloride comprises passing stream of gaseous cyanogen chloride into contact with anhydrous aluminum chloride dissolved in liquid cyanuric chloride in absence of other solvent. No. 2,414,655. Thomas Metcalf to Imperial Chemical Industries, Ltd.
- Production of reaction products of halogenated butenes having three fluorine atoms attached to each primary carbon atom and fluorine or chlorine attached to each secondary carbon atom, with potassium permanganate and caustic alkali, in aqueous solution. No. 2,414,706. Jesse Babcock and Alexander Kischitz to Hooker Electrochemical Co.
- Making 3-indole aldehyde, steps of gradually adding indole to ethereal solution of alkyl magnesium bromide containing not more than four carbon atoms in alkyl radical while withdrawing gaseous paraffinic hydrocarbon as it is formed, etc. No. 2,414,715. Edgar Britton, John Livak and John Weele to The Dow Chemical Co.
- Preparing metallic phenolate salt of oil-soluble hydroxyaryalkyl amine product. No. 2,414,729. Charles Fleming, Jr. and John McNab to Standard Oil Development Co.
- Recovering olefins from olefin-containing feed stock comprising steps of passing feed stock in sequence through first and second absorption zone, contacting feed stock in second absorption zone with absorption liquid comprising H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O under conditions to absorb olefin in absorption liquid, etc. No. 2,414,737. Raymond Heinrich to Standard Oil Development Co.
- Olefin hydration process in which slop acid is reconditioned for reuse as olefin absorbent. No. 2,414,759. Henry Mottern to Standard Alcohol Co.
- Separating from one another two aliphatic hydrocarbons containing more than 2 and less than 7 carbon atoms in molecule and which tend to distill together but have different degrees of saturation. No. 2,414,761. Howard Nutting and Lee Horsley to The Dow Chemical Co.
- Production of acrylonitrile consists in reacting anhydrous acetylene with anhydrous cyanide acid gas at 850° F. to 1150° F. in presence of potassium cyanide deposited on magnesium oxide. No. 2,414,762. John Owen and Charles Kimberlin, Jr. to Jasco, Inc.
- Obtaining alkylated phenol comprising passing phenol and hydrocarbon feed stock including tertiary olefin and substantial amount of hydrocarbon other than tertiary olefin into the reaction zone, contacting phenol and hydrocarbon feed stock in reaction zone with alkylation catalyst under conditions to cause alkylation of substantial portion of tertiary olefin with phenol, etc. No. 2,414,764. Reuben Pfennig to Standard Oil Development Co.
- Ethyl tertiary-butyl peroxide. No. 2,414,769. Frederick Rust and Frank Dickey to Shell Development Co.
- Production of diolefins comprises subjecting polymers having at least 10 carbon atoms to molecule prepared by polymerizing tertiary olefins to 800° F. to 1400° F. No. 2,414,770. Helmuth Schneider and Vincent Mistretta to Jasco, Inc.
- Producing metallic salts of sulfonic acids including steps of treating naphthenic petroleum fraction with sulfonating agent under conditions to produce acid sludge including acid sludge bodies and green sulfonic acids and mixture of oil and mahogany sulfonic acids, etc. No. 2,414,773. Jere Showalter to Standard Oil Development Co.
- Pyridones and process for making them. No. 2,414,783. Wilhelm Wenner, John Plati to Hoffmann-La Roche Inc.
- Continuous method for dehydrogenating normal butenes to form butadiene comprises separately heating steam to above reaction temperature and heating butene to below reaction temperature, mixing heated materials, injecting mixture into reaction zone where butenes contact dehydrogenation catalyst at 1100° F. to 1300° F. No. 2,414,816. Carl Kleiber, Donald Campbell, Daniel Stines and Channing Nelson to Standard Oil Development Co.
- In production of diolefins by catalytic dehydrogenation of more saturated hydrocarbons in presence of steam to form gaseous product stream containing diolefin, steam and unstable tar-forming and gum-forming impurities, improved method of cooling product stream to prevent degradation of diolefin. No. 2,414,817. Carl Kleiber, Donald Campbell, Daniel Stines and George Atkins to Standard Oil Development Co.
- Making cyclobutane, consists in subjecting cyclopentanone in vapor stage to irradiation by visible and ultra-violet 350° C. and 10 to 200 mm. of mercury. No. 2,414,880. George Kistiakowsky and Sidney Benson to Godfrey L. Cabot, Inc.
- Preparing free biguanide, comprises reacting alkali metal hydroxide with inorganic salt of biguanide in presence of wetting agent consisting of alkali metal salt of product selected from alkylated aromatic hydrocarbon sulfonates, alkylated phenol sulfonates, higher alkyl sulfates, dialkyl esters of sulfosuccinic acid, sulfonated ethers, sulfated ethers, N-acyl taurines, sulfonated pine oil, sulfonated vegetable oil and sulfonated petroleum oil. No. 2,414,950. Joseph Ingram to Monsanto Chemical Co.
- Dehydrogenation of mixture comprising normal butane and normal butene to form butadiene, the improved method of operation comprises separating isobutene from unconverted normal butane and normal butene before return to dehydrogenation step. No. 2,414,962. William Mattox to Universal Oil Products Co.
- Preparing 2,5-dichlorodioxane, comprises chlorinating dioxane directly at temperatures below 10° C. No. 2,414,982. William Smedley.
- Preparing 2,5-dichlorodioxane, comprises passing dry hydrogen chloride into solution of dioxadiene in non-aqueous organic solvent substantially inert to hydrogen chloride. No. 2,414,989. Robert Umhoefer.
- Making ester of organic acid comprises intimately contacting organic acid with ethylene in presence of esterification catalyst consisting of mixture of BF<sub>3</sub> and hydrofluoric acid until esterification of organic acid has been effected. No. 2,414,999. Arthur Bearse and Richard Morin to Standard Oil Co.
- Reacting organic acid with secondary olefin, comprises intimately admixing with acid a catalyst comprising boron fluoride and hydrogen halide and contacting resultant mixture under conversion conditions with secondary olefin. No. 2,415,000. Arthur Bearse and Richard Morin to Standard Oil Co.
- Organic polysulfides. No. 2,415,002. Herman Bruson to The Resinous Products & Chemical Co.
- Recovery of butadiene from mixture of hydrocarbons comprising butadiene and other closely-boiling C<sub>4</sub> hydrocarbons including butene-1 and butene-2. No. 2,415,006. Karl Hachmuth to Phillips Petroleum Co.
- Butadiene stabilization. No. 2,415,009. Lewis Hatch and David Adelson and Billee Blackburn to Shell Development Co.
- Substituted 5-amino-1,3-dioxanes. No. 2,415,021. Glen Morey to Commercial Solvents Corp.
- Sulfenamides. No. 2,415,029. George Smith, Jr. to The Firestone Tire & Rubber Co.
- Acetals of nitro alcohols. No. 2,415,046. Murray Senkus to Commercial Solvents Corp.
- Production of cyclohexane from naphthenic gasoline fraction having maximum boiling point below boiling point of normal heptane, comprising methylcyclopentane, cyclohexane and open chain paraffins having six and seven carbon atoms to molecule. No. 2,415,065. William Ross and Philip Pezzaglia to Shell Development Co.
- Production of cyclohexane from hydrocarbon mixture comprising methylcyclopentane, cyclohexane and open chain paraffins having six and seven carbon atoms to molecule. No. 2,415,066. William Ross and Philip Pezzaglia to Shell Development Co.

Making alkyl phenols comprises condensing substantially equimolecular proportions of phenol and of hydrocarbon of group consisting of isobutylene and di-isobutylene in presence of tetraphosphoric acid as catalyst under anhydrous conditions in presence of acid-activated siliceous material. No. 2,415,069. James Arvin and James Hunn to The Sherwin-Williams Co.

Basic-alkyl esters and their salts. No. 2,415,079. Frederick Blicke to Regents of the University of Michigan.

Continuous manufacture of phenol from crude benzol wherein crude benzol vapor and oxygen-containing gas is passed under pressure through heated reaction zone void of solid catalyst to convert part of benzene in crude benzol to phenol and other oxidation products, and unreacted benzene is separated from phenol and oxidation products. No. 2,415,101. Robert Kriebel and William Denton to Socony-Vacuum Oil Co., Inc.

Preparing pure oxo compounds of alkene hydrocarbons including aldehydes, alcohols, fatty acids and ketones, from hydrocarbon mixtures containing alkenes. No. 2,415,102. Alfred Landgraf and Otto Roelen.

Kettle refining of oils containing free fatty acids comprises, mixing with oil, in presence of elevated temperature not exceeding 150° F., aqueous refining solution containing alkali to neutralize fatty acids and to form refined oil and foots, and polyhydric alcohol, etc. No. 2,415,140. Edward Liebscher.

Oxidation of heterocyclic nitrogen compound containing in its structure pyridine nucleus substituted by oxidizable organic grouping attached to nucleus by one or more carbon-to-carbon linkages to carboxylic acid. No. 2,415,147. James Ogilvie and Alvin Sweet to Allied Chemical & Dye Corp.

Making methyl ester of m-dimethylaminobenzoic acid comprising heating hydrated hydroiodic acid salt of m-trimethylbenzotain to decompose most of it by driving off hydrogen iodide and water as gases, etc. No. 2,415,230. Clyde Adams to The National Cash Register Co.

Amino-alcohol esters of aralkyl-oxy-benzoic acids. No. 2,415,235. Walter Christiansen and Sidney Harris to E. R. Squibb & Sons.

Manufacture of new phenothiazine derivatives, namely compounds of general formula  $C_{12}H_9N_3CH_2OR$  in which R is selected from alkyl and cycloalkyl radicals and alkyl and cycloalkyl radicals substituted with non-reactive substituents. No. 2,415,252. Alfred Levi to Imperial Chemical Industries, Ltd.

Sulfosuccinate esters of 3,5-alkylcyclohexanols. No. 2,415,255. Kathryn Lynch to American Cyanamid Co.

Production of saturated alpha, omega-dinitriles comprises reacting saturated alpha, omega-dihalide with metal cyanide taken from group consisting of sodium cyanide, potassium cyanide, cuprous cyanide, calcium cyanide, and zinc cyanide in liquid reaction medium, etc. No. 2,415,261. Arthur Rogers to E. I. du Pont de Nemours & Co.

Preparing 2-chlorobutadiene-1,3 comprising subjecting 2,2,3-trichlorobutane to vapor phase pyrolysis at 300 to 600° C. No. 2,415,294. Arthur Levine and Oliver Cass to E. I. du Pont de Nemours & Co.

Preparing 2-chlorobutadiene-1,3 comprising subjecting 2,2,3-trichlorobutane to vapor phase pyrolysis at 300 to 600° C. in presence of copper or copper compounds. No. 2,415,295. Oliver Cass to E. I. du Pont de Nemours & Co.

Refining glyceride oils and recovering unsaponifiables, comprises subjecting glyceride oil containing unsaponifiables to neutralizing step employing non-saponifying alkali and including separation of soap stock from neutral oil in order to condition glyceride oil for separation of unsaponifiables, mixing separated neutral oil with aqueous agent. No. 2,415,301. Morris Matlikow to Benjamin Clayton, doing business as Refining Unincorporated.

Treating crude glyceride oil to recover valuable minor constituents comprises, subjecting oil to gum precipitating and separating operation including precipitating gums in oil with aqueous agent, separating precipitated gums from oil to produce gum-free oil, subjecting resulting oil to alkali refining operation. No. 2,415,313. Benjamin Thurman to Benjamin Clayton, doing business as Refining Unincorporated.

Production of acetylene and lime hydrate. No. 2,415,328. Arthur Andersen, Milton Eaton and Andrew Holm to Shawinigan Chemicals, Ltd.

High molecular weight glycols. No. 2,415,335. Herman Brunson and Warren Niederhauser to The Resinous Products & Chemical Co.

Producing water-soluble, sulphonated compound from condensation product of distillate of cashew nut shell liquid and formaldehyde comprises mixing condensation product with high molecular weight unsaturated fatty acid, gradually adding concentrated sulphuric acid to mixture while maintaining temperature at not more than 30° C. No. 2,415,347. Ernest Freund and Paul Mahler to General Foods Corp.

Producing cominuted phenothiazine. No. 2,415,363. John Mitchell and George Webb to Koppers Co., Inc.

Diethylene glycol bis (methyl fumarate). No. 2,415,366. Irving Muskat to Marco Chemicals, Inc.

Substituted 4-hydroxyalkylamino-1,8-naphthalic acid imides. No. 2,415,373. Mario Scalera and Asa Joyce to American Cyanamid Co.

Sulfuric acid esters of hydroxy-alkylamino-anthraquinones. No. 2,415,377. William Tatum to Imperial Chemical Industries Ltd.

Pyrolyzing propylene glycol monoacetate comprises heating it to 425-525° C. thereby forming allyl acetate and isomers thereof, allyl alcohol, propionaldehyde and water, separating fraction boiling below 110° C. from balance of materials subjected to pyrolysis, deriving allyl alcohol from such fraction. No. 2,415,378. Thomas Vaughn to Wyandotte Chemicals Corp.

Alkoxy end-blocked siloxanes and method of making. No. 2,415,389. Melvin Hunter, Herbert Fletcher and Chester Currie to The Dow Chemical Co.

Preparing glyoxal sulphate, comprises reacting tetrachlorethane and oleum in presence of catalyst, step comprises slowly adding catalyst to mixture of oleum of over 25% and tetrachlorethane, temperature of reaction maintained at 50-75° C. No. 2,415,397. Enno Wolthuis and John Lawler to General Aniline & Film Corp.

## Canadian

As new compounds isoamyl phenyl cyanamide, n-butyl-o-tolyl cyanamide and ethyl-1-naphthyl cyanamide. No. 439,848. American Cyanamid Company (Richard O. Rohlin).

Method of preparing an alamine ester of a 2,5-diarylpyrrole-3,4-dicarboxylic acid. No. 439,851. American Cyanamid Company (Donald E. Sargent).

Process for die pressing soaps and other detergents which comprise introducing an inert pulverulent material between the detergent blank and the face of a die. No. 439,866. Colgate-Palmolive-Peet Company (Charles Frederick Fischer).

Hydrazino-1,3,5-triazino derivatives of substituted phenylarsenic compounds. No. 439,964. Ernst A. H. Friedheim.

Unsaturated derivatives of alpha-hydroxyisobutyric acid esters and acetone cyanhydrin. No. 440,099. American Cyanamid Company (Philip M. Kirk and Paul P. McClellan).

Preparing melamine by fusing at temperatures of about 160-210° C. a solid mixture of dicyandiamide and an alkali metal salt of a weak, non-oxidizing acid. No. 440,223. American Cyanamid Company (David Walker Jayne, Jr. and Harold Milton Day).

Di-n-octyl malate hexaethylene glycol monoether. No. 440,224. Ameri-

can Cyanamid Company (Edmund R. Meincke).

Process for the production of trichloroacetonitrile and its polymers. No. 440,245. Canadian Industries, Ltd. (Reginald Thomas Foster).

Metal salt of an N-polyhydroxyalkyl-dithiocarbamic acid wherein the N-polyhydroxyalkyl radical is that of a reducing sugar. No. 440,247. Canadian Industries Ltd. (Madison Hunt)

## \*Paper, Pulp

Treating paper normally pervious to oleaginous materials to render same impervious comprising, conditioning surface by wetting with water and before drying forming continuous film containing fibrous pectate. No. 2,414,251. Clarence Wilson to California Fruit Growers Exchange.

Thermoplastic paper useful as filtering medium in manufacture of tea bags. No. 2,414,833. Ray Osborne to C. H. Dexter & Sons, Inc.

Process of sizing paper and like with animal glue applied to surface, having high wet tensile and wet rub strengths, comprises passing glue-sized paper through squeezing rolls with deposited glue in contact with rotating squeeze roll partially immersed in aqueous solution containing 1 per cent each formaldehyde and glyoxal. No. 2,414,858. Paul Davidson to Strathmore Paper Co.

Moisture resistant coating composition for paper consisting of from 30 to 50% of rosin derivative liquid at ordinary temperatures, from 45 to 65% of metallic rosinate, and from 6 to 15% of waxy substance. No. 2,415,160. Daniel Cameron to Hercules Powder Co.

## Canadian

Manufacture of waterproof paper by mixing with the pulp an emulsion in dilute aqueous solution of alkali of a mixture of coal tar pitch and a percentage of natural asphalt. No. 440,018. International Bitumen Emulsion Ltd. (John Alexander Montgomerie and Peter Kennedy Archibald)

## \*Petroleum

Hydrocarbon oil composition comprising major proportion hydrocarbon oil of lubricating viscosity and small amount of polyvalent metal salt of sulfur-containing acid of phosphorus containing at least one oil-solubilizing organic substituent, number of carbon atoms being at least 24. No. 22,829. John Rutherford and Robert Miller to California Research Corp.

Hydrocarbon oil composition comprising major proportion of hydrocarbon oil of lubricating viscosity and small amount of alkaline earth metal salt of sulfur-containing acid of phosphorus. No. 22,830. John Rutherford and Robert Miller to California Research Corp.

Separating unsaturated hydrocarbons including olefin and aromatic hydrocarbons from mixture of saturated and unsaturated hydrocarbons comprise, extracting hydrocarbon mixture with solvent comprising a poly-olefin glycol having molecular weight of 1000. No. 2,414,252. Harry Ashburn to The Texas Co.

Catalytic cracking of liquid heavier hydrocarbon oil charge to convert to gasoline hydrocarbons involving alternate periods of conversion and reactivation, etc. No. 2,414,256. du Bois Eastman and Charles Richker to The Texas Co.

Treating hydrocarbon materials containing organic fluorine-containing products resulting from treatment with fluorine-containing catalyst to remove organic fluorine-containing products, comprises subjecting hydrocarbon materials to defluorinating agent comprising oxide of metal selected from calcium and magnesium. No. 2,414,259. Melvin Holm to California Research Corp.

Synthesis of high anti-knock motor fuel components, comprises reacting ethylene with isoparaffin in presence of hydrogen fluoride at 700° to 900°F. hydrogen fluoride and reactants being in vapor phase. No. 2,414,271. Arlie O'Kelly and Jacob Meadow and Robert Woodward to Socony-Vacuum Oil Co., Inc.

Catalytic conversion process. No. 2,414,276. Eugene Sensel and Roland Beck to The Texas Co.

Controls for isomerization systems. No. 2,414,371. Nathan Fragen and Cecil Nysewander to Standard Oil Co.

Conversion process, comprises contacting hydrocarbons with subdivided solid catalyst in reaction zone, removing contaminated catalyst particles from zone, burning contaminants therefrom in contact with oxygen-containing gas in regenerating zone, separately removing resultant combustion gases and regenerated catalyst particles from regenerating zone, etc. No. 2,414,373. Clarence Gerhold to Universal Oil Products Co.

Controlling viscosity of aqueous well drilling mud, comprises adding mixture containing water-insoluble potassium metaphosphate and water-insoluble sodium metaphosphate. No. 2,414,381. Norman Martello to Hall Laboratories, Inc.

Effecting continuous dehydrogenation of hydrocarbon in presence of steam at 580° C. to 700° C., improvement comprises effecting dehydrogenation with catalyst consisting of magnetic oxide of iron and potassium carbonate. No. 2,414,585. Frank Eggertsen and Hervey Voge to Shell Development Co.

Distilling hydrocarbonaceous solids, to recover valuable volatile constituents comprises introducing solid material in finely divided state into confined distilling zone, therein maintaining bed of subdivided solid particles in turbulent fluid state and effecting distillation of volatiles therefrom by heating stream of non-oxidizing fluid in heating coil to temperature to effect distillation, introducing the hot fluid upwardly into bed, etc. No. 2,414,586. Gustav Egloff to Universal Oil Products Co.

Production of aromatic hydrocarbons from hydrocarbon mixture containing five membered alicyclic ring compounds having at least six carbon atoms to molecule. No. 2,414,620. Robert Trimble to Shell Development Co.

Desulfurization of hydrocarbons containing organic sulfur compounds comprises selectively extracting sulfur compounds by contacting hydrocarbons containing same with desulfurized acid-soluble oil obtained during alkylation of paraffins with olefins in presence of hydrogen fluoride as catalyst, etc. No. 2,414,626. John Allen to Phillips Petroleum Co.

Aqueous mud-laden well drilling fluid containing small percentage of heavy metal of class consisting of copper, nickel, iron and titanium. No. 2,414,647. Raymond Hoeppel to National Lead Co.

Art of treating wells. No. 2,414,668. George Ratcliffe to National Lead Co.

Cracking heavy residual petroleum oil containing constituents unvaporizable without decomposition and inorganic impurities. No. 2,414,736. Joseph Gray to Standard Oil Co.

Contact mass for catalytic hydrocarbon reactions conducted in cycle of endothermic on-stream and exothermic regenerating operations comprising mixture of discrete pieces of catalytic material, heat absorbing material of artificially fused oxide, heat absorbing material capable of withstanding elevated temperatures of 2000° F. No. 2,414,812. Eugene Houdry to Houdry Process Corp.

Catalytic reactions. No. 2,414,883. Homer Martin to Standard Oil Development Co.

\* U. S. Patents from Vol. 594, Nos. 2, 3, 4, Vol. 595, No. 1.

Obtaining lower boiling hydrocarbons suitable for motor fuel from higher boiling hydrocarbon oil of type of gas oil comprises subjecting higher boiling hydrocarbon oil to treatment with between 5000 and 20,000 cubic feet per barrel of oil of mixture of hydrogen and methane. No. 2,414,889. Eger Murphree to Standard Catalytic Co.

Application of metal sulfide catalyst for vapor phase treatment of mineral oils in presence of hydrogen, improvement comprises employing catalyst with following repeated sequence of processing steps: (1) dehydrogenation of sulfur-free mineral oil; (2) removing carbonaceous deposits from catalyst by burning; (3) desulfurization of a sulfur-rich mineral oil. No. 2,414,951. Zene Jasatis and Donald Davidson to Shell Development Co.

Removing sulphur from mineral oil, comprises heat-digesting crude oil in presence of solid base forming sulphides with acid sulphur compounds, at 500° F. but below cracking, while preventing vaporization, cooling oil to 200° F., mixing water therewith, separating off water and sulphide matter formed, subjecting oil to fractional distillation into lighter and heavier fractions. No. 2,414,963. Elliott McConnell to The Standard Oil Co.

Conversion of hydrocarbons. No. 2,414,972. Edwin Nelson to Universal Oil Products Co.

Catalytic cracking process, improvement comprises treating hydrocarbon oil heavier than gasoline with minor portion of regenerated cracking catalyst to remove deleterious carbon forming compounds from oil without effecting conversion of oil to lower boiling hydrocarbons, etc. No. 2,414,973. Edwin Nelson to Universal Oil Products Co.

Vapor phase isomerization of isomerizable saturated hydrocarbon with aluminum halide catalyst. No. 2,415,061. Martin de Simo and Frank McMillan to Shell Development Co.

An operation in which petroleum distillate is contacted in vapor phase at 1300° to 1650° F. with iron, chromium, and nickel alloy, step of incorporating in distillate during operation corrosion inhibiting amount of low boiling, non-acidic oxygenated organic compound. No. 2,415,161. Elza Camp to Standard Oil Development Co.

Recovering olefin-free hydrocarbon fraction comprising steps of contacting hydrocarbon feed stock including olefin in amount no greater than 75% with complex of boron halide and organic acid selected from alkyl and aryl mono-carboxylic acids. No. 2,415,171. Joseph Horeczy to Standard Oil Development Co.

Treatment of complex hydrocarbon fraction to separate chemically similar hydrocarbon components therefrom from other hydrocarbon components contained therein which ordinarily distill from hydrocarbon fraction in same temperature range as said chemically similar hydrocarbon components. No. 2,415,192. John Rittenhouse to Union Oil Co., of California.

Liquid phase isomerization of isomerizable paraffinic hydrocarbon with aid of aluminum halide isomerization catalyst. No. 2,415,197. Adrianus van Peski to Shell Development Co.

Production of gasoline and alkyl aromatic hydrocarbons comprises cracking fresh hydrocarbon oil and aliphatic recycle stock, separating from resultant products gasoline fraction having end point of from 250° F. to 350° F. and naphtha fraction boiling above range of gasoline fraction, etc. No. 2,415,272. Wayne Benedict and William Mattox to Universal Oil Products Co.

Producing hydrocarbon blend suitable as aviation fuel from mixture of paraffinic and aromatic hydrocarbons boiling in gasoline range. No. 2,415,285. John Walter and Edwin McGrew to Universal Oil Products Co.

Batch distillation process comprising steps of charging batch still with oil stock, heating oil stock to distillation temperature, passing still vapors into treating zone comprising rectifying section and stripping section at point intermediate rectifying and stripping sections, etc. No. 2,415,337. Samuel Carney to Phillips Petroleum Co.

### \*Photographic

Lacquer-type light-sensitive silver halide emulsion adapted to spraying or brushing consisting of solution of polyvinyl acetate having vinyl acetate content of 80 to 90% and silver halide dispersed therein in liquid consisting of water, low boiling water-soluble solvent for polyvinyl acetate and 0 to 50% of high boiling compatible liquid. No. 2,414,207. Wesley Lowe to Eastman Kodak Co.

Photographic developer comprising aqueous alkaline solution of compound described in patent. No. 2,414,491. Vsevolod Tulagin to General Aniline & Film Corp.

Drying apparatus for photographic film. No. 2,414,502. Frederick Willcox.

Process comprises exposing to light under pattern to be reproduced, light-sensitive layer on suitable support comprising light-sensitive lead compound, developing thus formed latent image in solution of strong reducing agent selected from sodium hydrosulfite, sodium stannite, titanous chloride and titanous sulfate. No. 2,414,839. Andre Schoen to General Aniline & Film Corp.

Photographic element comprising support having at least one light-sensitive layer comprising hydrophilic ether of hydrolyzed aliphatic mono-olefin/vinyl ester interpolymer. No. 2,415,381. David Woodward to E. I. du Pont de Nemours & Co.

Color-yielding element comprising support bearing at least one layer composed of hydrophilic dye intermediate ether of hydrophilic cellulose derivative having light-sensitive silver salt dispersed therethrough, ether being capable of reacting with diazo compound to form azo dye. No. 2,415,382. David Woodward to E. I. du Pont de Nemours & Co.

### \*Polymers

Liquid thermo-setting resin adhesive composition comprising resinous condensation product obtained by heat-reacting 37% aqueous formaldehyde, urea, and 28% aqueous ammonia by boiling at 95 to 100°C. for 25 to 35 minutes. No. 22,828. Gustavus Miller.

Process which comprises heating solution of polyvinyl alcohol having 75% of free hydroxyl groups per molecule which contains 20 to 150% by weight of dimethylolurea based on polyvinyl alcohol at 60 to 100° C. until insoluble in water at 20° C. but dissolves at 40 to 80° C., precipitating light-sensitive silver salts. No. 2,414,208. Otis Murray to E. I. du Pont de Nemours & Co.

Preparation of polymers of ethylene. No. 2,414,311. Alfred Larson to E. I. du Pont de Nemours & Co.

Dielectric sheet material of paper impregnated with copolymerized mixture of 95 per cent N-vinylcarbazole and 5 per cent diallylphthalate. No. 2,414,320. Harry Miller and Levin Foster to General Electric Co.

Operating polymerization plants. No. 2,414,328. Roderick Pinkerton to Sinclair Refining Co.

Polymerization process comprises reacting olefinic hydrocarbon having at least 3 carbon atoms per molecule in presence of liquid hydrogen fluoride catalyst which has added a minor proportion of hydrogen cyanide. No. 2,414,380. Carl Linn to Universal Oil Products Co.

Composition comprising a polyvinyl halide resin containing more than 85% polyvinyl halide, and combination stabilizer and plasticizer in-

cluding diisobutyl adipate. No. 2,414,399. Earl Sorg to The Glenn L. Martin Co.

Unsaturated esters and polymers thereof. No. 2,414,400. Franklin Strain to Pittsburgh Plate Glass Co.

Ternary acrylic ester, styrene, diene interpolymer. No. 2,414,401. Pliny Tawney to United States Rubber Co.

Heat polymerizable N-vinyl pyrrole composition stabilized towards polymerization at below 100° C. but above its melting point, comprises N-vinyl pyrrole compound containing up to a few percent, of morpholine. No. 2,414,407. Werner Freudenberg to General Aniline & Film Corp.

Manufacturing plywood, comprising applying to certain plies dihydroxy benzene-aldehyde resin adhesive base capable of cold-setting in presence of setting agent. No. 2,414,414. Philip Rhodes to Pennsylvania Coal Products Co.

Insoluble, infusible heat-set resin comprising reaction product of 82 to 88 parts by weight of dry permanently fusible monohydric phenol-aldehyde resin and 18 to 12 parts dry chemical addition product of hexamethylenetetramine and resorcinol. No. 2,414,416. Philip Rhodes to Pennsylvania Coal Products Co.

Improved electrical high frequency insulation of plasticized polymerized styrene admixed with hydrocarbon substitution compound of naphthalene having not more than 5 carbon atoms in chain. No. 2,414,497. Arthur Warner and Archibald New to International Standard Electric Corp.

Container which can be sterilized by heating, comprising combination, fibrous material and impregnating coating comprising 70 per cent ethyl cellulose having from 43 per cent to 50 per cent ethoxyl content and up to 20 per cent of alkyl acetamide. No. 2,414,540. John Lum to Westinghouse Electric Corp.

Water-soluble hydrogenated polyallyl alcohol containing at least 0.006 gram more of combined hydrogen per gram of polymer and having improved stability toward discoloration than parent unhydrogenated polyallyl alcohol having degree of polymerization of 4 to 20. No. 2,414,578. David Adelson and Harold Gray, Jr. to Shell Development Co.

Attaching thermoplastic sheets to other materials. No. 2,414,705. Robert Ames to Goodyear Aircraft Corp.

Preparing emulsion of olefinic polymers comprising combination of kneading together high molecular weight olefinic polymer having molecular weight within the range between 27,000 and 500,000 and ester of fatty acid having from 12 to 20 carbon atoms with polyalcohol having from 2 to 3 carbon atoms per molecule, etc. No. 2,414,740. Robert Holmes to Jasco, Inc.

Halogenated cross-linked aromatic amine polymer comprising condensation product of one molecular proportion of primary aromatic amine selected from aniline, metaphenylene diamine, meta toluidine and diamino diphenyl methane and at least one molecular proportion of aldehyde selected from formaldehyde and furfural, etc. No. 2,414,748. Samuel Kistler to Norton Co.

Selectively polymerizing isobutylene contained in refinery C<sub>4</sub> fraction containing substantial amounts of normal butylenes and isobutylene, in two-stage process comprises as first stage selective extraction of isobutylene from the C<sub>4</sub> fraction by intimately contacting same with aqueous benzene sulfonic acid solution etc. No. 2,414,760. Henry Mottern to Standard Oil Development Co.

Apparatus for making pipe from thermoplastic resin. No. 2,414,776. Wilbur Stephenson and James Palmer to The Dow Chemical Co.

Production of toluene-soluble polyvinyl chloride of improved colour stability, comprises dispersing in aqueous medium containing formaldehyde and peroxide as polymerization catalyst, vinyl chloride as only other unsaturated polymerizable substance, heating dispersion under pressure. No. 2,414,934. Patrick Denny to Imperial Chemical Industries, Ltd.

Heating above 140° F. mass of normally liquid unsaturated organic product capable at elevated temperatures of forming solution with solid polyvinyl chloride which solution on cooling is gel at 70° F. and while mass is in heated condition, agitating mass in presence of free oxygen containing gas until viscosity of mass at 25° C. has increased at least 50%, etc. No. 2,415,096. Mortimer Harvey to Harvel Research Corp.

Production of polymers from alcohols using a boron fluoride-acetic acid complex catalyst. No. 2,415,172. Joseph Horeczy to Standard Oil Development Co.

Composition of matter comprising solution of linear polyamide in normally liquid mono-hydroxy organic cyanide. No. 2,415,193. Arthur Rogers to E. I. du Pont de Nemours & Co.

Polyvinyl acetal resin pressure molding composition, having decreased tendency to stick to mold after molding, containing physical mixture of water insoluble polyvinyl acetaldehyde acetal resin, and mono-hydroxy carboxylic acid. No. 2,415,319. George Whitehead to Monsanto Chemical Co.

Plasticized composition comprising butadiene-acrylonitrile interpolymer and naphthenic acid amide. No. 2,415,356. Henry Kellog and George Serniuk to Jasco, Inc.

### Canadian

Process for the manufacture of chlorinated polyvinyl chloride. No. 439,858 Canadian Industries Ltd. (James Chapman and John William Croom Crawford)

Method of making a resin comprising forming a mixture of a dihydroxy benzene, a non-alkaline catalyst and a liquid diluting medium. No. 439,910. Pennsylvania Coal Products Company (Arthur J. Norton).

Producing a permanently fusible resin containing at its essential ingredient a resorcin-aldehyde resin. No. 439,912. Pennsylvania Coal Products Company (Philip H. Rhodes).

Polymerizing a mixture of methyl acrylate and acrylonitrile in an aqueous solution of a zinc salt, a unit weight of which is soluble in less than about 0.3 of a unit weight of water. No. 439,992. American Cyanamid Company (Edward L. Kropa).

Preparing phthalic glyceride resins of low acid number by reacting phthalic anhydride with glycerine at elevated temperatures in the presence of melamine. No. 440,098. American Cyanamid Company (Herbert John West).

Polymerizable composition, including (1) an unsaturated alkyd resin (2) triallyl tricarballoylate and (3) a catalyst for accelerating the copolymerization. No. 440,226 American Cyanamid Company (Edward L. Kropa).

Producing a chlorinated polymer of vinyl chloride by preparing an aqueous dispersion of polyvinyl chloride and passing chlorine into the dispersion in the presence of actinic radiation. No. 440,237 Canadian Industries, Ltd. (Reginald George Robert Bacon and William John Roy Evans).

Process for the preparation of dioxolane polymers. No. 440,241. Canadian Industries, Ltd. (William Franklin Gresham).

An acetal of a hydrolyzed interpolymer of ethylene with a vinyl ester of an organic carboxylic acid. No. 440,243. Canadian Industries, Ltd. (William Henry Sharkey).

\* U. S. Patents from Vol. 594, Nos. 2, 3, 4, Vol. 595, No. 1. Canadian from Feb. 25—March 18, 1947.

## \*Processes and Methods

Process of restoring filtering characteristics of filter cloth used to separate insoluble residues containing siliceous material from aluminate solution, comprises washing cloth in aqueous solution of acid selected from hydrochloric acid, sulphuric acid, nitric acid, formic acid, acetic acid and fluoboric acid, and, as a second step, washing in solution of hydrofluoric acid. No. 2,414,326. James Newsome to Aluminum Co. of America.

Apparatus for detecting concentration, in liquid, of material capable of undergoing change in its state of oxidation, comprising pair of similar polarization cell devices, having at least one electrode in contact with liquid containing said material, subject to depolarization thereby. No. 2,414,411. Henry Marks to Wallace & Tiernan Products, Inc.

Producing single uniaxial crystal having predeterminedly oriented axis, comprising forming in open vessel melt comprising crystalline material, positioning at bottom of melt relatively thin element comprising rigid material inert with respect to melt and having substantially higher melting point than crystalline material, etc. No. 2,414,679. Cutler West to Polaroid Corp.

Producing predeterminedly oriented section of single crystal, comprising forming melt comprising crystalline material, bringing into contact with melt cleavage surface of mica, etc. No. 2,414,680. Cutler West and Frederick Binda to Polaroid Corp.

Catalytic process and apparatus. No. 2,414,852. Harvey Burnside and Henry Ogorsky to Standard Oil Development Co.

In method of gas analysis in which combustible constituents are burned and products of combustion measured, comprise admitting gas to be analyzed into closed system containing cold spot of temperature sufficiently low to effect condensation of constituents to be determined, etc. No. 2,414,876. Leo Horvitz to Esme Rosaire.

Process and apparatus for drying of liquid-containing biological materials by freezing and sublimating under low pressure in the presence of a chemical desiccant. No. 2,414,940. Earl Flosdorf and Francis Stokes, Jr. to Tabor-Olney Corp.

Recovery of extraction solvent for phenolic compounds comprises continuously introducing near top of rectifying column phenolic waste water from coking and gasifying plants containing extraction phenolic solvent, carbon dioxide and ammonia introducing steam counter-current thereto, etc. No. 2,415,087. Alfred Dierichs.

Apparatus for separation of very fine particles from liquid comprising means for causing gyratory motion, closed pan attached to gyratory means, inlet for liquid to interior of pan, fine mesh screen in bottom of pan tilted from horizontal, outlet in pan at highest point on screen, catch basin under pan, etc. No. 2,415,268. Edward Wendt to Hercules Powder Co.

Effecting quick heating of liquid comprises normally maintaining heating fluid at predetermined temperature, passing heating fluid in heat exchange relation to liquid to be heated to prescribed temperature, causing liquid as long as its temperature is at prescribed value to flow through discharging passage, causing liquid to be diverted to recirculating heat exchange passage as long as temperature remains below prescribed value, etc. No. 2,415,304. Raymond Olson to Taylor Instrument Companies.

## \*Rubber

Plasticizing vulcanized rubber scrap, comprises mechanically working material under oxidizing conditions with admixed acid material and a mercaptan at below 180° F. No. 2,414,145. Walter Evans to Boston Woven Hose & Rubber Co.

Forming corrugated microporous storage battery separators, comprises filling pores of sheet of vulcanized microporous rubber with water, raising temperature of filled sheet to not less than 180° F., or more than 212° F., pressing wet and heated sheet between corrugated forms to corrugate surface, etc. No. 2,414,177. William Smith to The Electric Storage Battery Co.

Making articles of rubber-like materials, comprises depositing in desired shape the solids of aqueous dispersion of copolymer of butadiene and monovinyl compound, dispersion containing water-insoluble clay, drying and vulcanizing. No. 2,414,391. Charles Peaker to United States Rubber Co.

Making articles of rubber-like materials, comprises depositing in desired shape the solids of aqueous dispersion of copolymer of butadiene and another polymerizable material, dispersion containing carbon black added to copolymer dispersion, and drying. No. 2,414,394. John Rumbold to United States Rubber Co.

Reclaiming scrap containing vulcanized polychloroprene comprises heating in comminuted condition at 300° F. to 420° F. in presence of water and lecithin to reduce scrap to plastic state where it has Mooney viscosity of less than 200 at 180° F. No. 2,414,428. Walter Kirby and Leo Steidle to United States Rubber Co.

Making vulcanized rubber goods comprises preparing aqueous dispersion of rubbery material containing vulcanizing ingredients but insufficient metallic activator to effect vulcanization of rubbery material, separately preparing composition having property of coagulating dispersion and comprising solvent and solute material having acid reaction in solution, etc. No. 2,414,610. Kenneth Romick to American Anode, Inc.

Manufacture of rubber goods from latex. No. 2,414,611. Kenneth Romick to American Anode, Inc.

Vulcanizable composition comprising thermoplastic product of emulsion polymerization of mixture containing 25-40% styrene, 40-55% ethyl acrylate, 15-25% of butadiene-1,3. No. 2,414,803. Gaetano D'Alleio to General Electric Co.

Adhesion of rubber to magnesium. No. 2,415,030. John Rafter to The Firestone Tire & Rubber Co.

Machine for kneading and mixing rubber and like plastic substances. No. 2,415,091. Karl Frei.

## Specialties

Insecticide containing, as essential active ingredient, composition consisting of 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane and sulphur, the 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane present in 0.5% to 15% of weight of composition, sulphur constituting balance of composition. No. 2,414,193. Wallace Durham to Stauffer Chemical Co.

Manufacturing dust effective against insects, comprising fusing sulphur and quantity of di(monochlorophenyl) trichloroethane, fused mass containing between 20% and 99.5% of sulphur, cooling resulting mass until solid, grinding the solid. No. 2,414,216. Robert Wean and Frank Charlton to Stauffer Chemical Co.

Forming abrasive wire or rod, comprising dispersing abrasive powder in matrix, inserting matrix in ductile sheath, consolidating matrix by elongating, and exposing resulting consolidated abrasive impregnated wire or rod by removing material of sheath. No. 2,414,226. Samuel Everett.

Extreme pressure lubricant comprising hydrocarbon mineral oil, extreme pressure addition agent consisting of a di(3-carbomethoxy-4-hydroxy-

phenyl) polysulphide and organic corrosion inhibitor selected from 2-mercaptobenzothiazole and benzothiazole disulphide. No. 2,414,257. Elliott Evans and John Elliott to C. C. Wakefield & Co., Ltd.

Oil and grease-proof adhesive comprising animal glue possessing gel test strength from 150 to 300 grams, plasticizing mixture comprising urea and non-crystallizable sugar syrup in equal proportions, and water. No. 2,414,274. Otto Sass and Elmer Lemire to The Patent & Licensing Corp.

Composition for treatment of textiles, paper and fibrous materials, comprising 3 to 10 grams ferrous sulphate, .3 to 3 grams of acid of group consisting of phosphoric, tannic, citric, tartaric, formic, and .8 to 5 grams of weak black liquor of 12° Baume derived from sulphate process of making pulp. No. 2,414,327. Alvis Patterson.

Mild, nonirritating skin cleansing composition comprising sulfated oleic acid and alkali metal soap of saturated fatty acid. No. 2,414,452. Joseph Cunder to National Oil Products Co.

Flexible abrasive disk of coated abrasive type comprising layer of vulcanized fiber, phenol-aldehyde resin combining bond, layer of cloth bonded to vulcanized fiber, etc. No. 2,414,474. Cecil March to Minnesota Mining & Manufacturing Co.

Treated carbon brush for operating in sliding contact with conducting metal surface comprising porous carbon body and non-hygroscopic metallic halide salt incorporated in carbon body. No. 2,414,514. Howard Elsey to Westinghouse Electric Corp.

Laminated board comprising layers of bituminized fabric adhered together by silicate base adhesive having siliceous cement material therein to render adhesive water-insoluble and flame resistant, having retardant therein to delay hydration of silicate base and cement mixture. No. 2,414,533. George Johnston to The Philip Carey Manufacturing Co.

Manufacturing copper fungicides comprises reacting aqueous solution of copper and aluminum compounds selected from copper sulphate and copper carbonate and aluminum sulphate and aluminum oxide with alkali and protein selected from casein, soya flour, skim milk and wheat flour. No. 2,414,660. Alexander Nikitin to Tennessee Copper Co.

Manufacturing copper fungicides consists in reacting aqueous solution of copper salt and zinc salt selected from copper and zinc sulphates and copper and zinc carbonates with alkali and protein selected from casein, soya flour, skim milk and wheat flour. No. 2,414,661. Alexander Nikitin to Tennessee Copper Co.

Forming liquid products containing modified, dehydrated castor oil comprises mixing dehydrated castor oil, "maleic compound" and non-conjugated liquid fatty oil. No. 2,414,712. Don Bolley.

Packing material for use in connection with upper and lower fillers comprising intersecting cell forming strips, in form of even thickness molded pulp cushion pad. No. 2,414,724. William De Reamer to Mapes Consolidated Manufacturing Co.

Slushing compound comprising 90% of mineral oil having Saybolt Universal viscosity of 700 seconds at 100° F., 5% of nitrated tallow having iodine number of 30 and 5% of mineral oil sulfonates. No. 2,414,768. Theodore Roehner and Louis Sudholz to Socony-Vacuum Oil Co., Inc.

Insecticidal composition comprising bisdialkylaminobutene, selected from 1,4-bisdialkylamino-2-butenes and 3,4-bisdialkylamino-1-butenes, in which alkyl groups present contain three to six carbon atoms, and carrier therefor. No. 2,415,020. Glen Morey to Commercial Solvents Corp.

Resistance material comprising powdered glass 50%, powdered copper 40%, and powdered silicon 10%. No. 2,415,036. Archibald Quinn to Bendix Aviation Corp.

Insect-controlling composition comprising 5-amino-1,3-disubstituted-hexahydropyrimidine and carrier therefor. No. 2,415,047. Murray Senkus to Commercial Solvents Corp.

Producing copper impregnated graphite material for use as commutator brushes, bearings and the like comprises treating kish with soluble copper compound whereby iron in kish is replaced by copper of solution, treating altered kish with acid solution. No. 2,415,196. Ralph Steinberg and Dave Steinberg.

Adhesive material having flexible backing presenting interstices throughout at least one of its surfaces, normally tacky pressure-sensitive adhesive mass united to surface presenting interstices, and firm yet flexible and substantially non-tacky intermediate barrier layer presenting uniform surface to receive adhesive mass, comprising major proportions of polyisobutylene and filler inert to adhesive mass. No. 2,415,276. Donald Buckley and Robert Smith to Industrial Tape Corp.

Toxic composition comprising intimate mixture of fuller's earth of Georgia-Florida type and parasiticide agent, fuller's earth containing substantial amount of its water of hydration. No. 2,415,282. Frank Hartshorne to Floridin Co.

Lubricant comprising in combination major proportion of oil of lubricating viscosity and minor proportion of salt of sulfurized relatively high molecular weight carboxylic acid. No. 2,415,296. Bert Lincoln and Gordon Byrkit.

Mineral lubricating oil containing dissolved therein 0.01% to 1.0% of alkali metal mahogany sulfonate and 0.01% to 1.0% of polyvalent metal naphthenate. No. 2,415,353. Robert Johnston and Jones Wasson to Standard Oil Development Co.

## Canadian

Manufacturing abrasive articles by mixing a mass of abrasive particles with heat-hardenable adherable mixture of a dihydroxy-benzene-aldehyde resin and a methylene-containing setting and hardening agent. No. 439,911. Pennsylvania Coal Products Company (Philip H. Rhodes).

Light-activated dental material for use in crowns, inlays and similar tooth reconstructions, and in dental cement. No. 440,240. Canadian Industries, Ltd. (Frederick Charles Hahn).

Process for the manufacture of pre-gummed sheet material. No. 440,306. Salomon Newman (Shand Kydd Ltd.).

## \*Textiles

Reducing tendency to shrink of woollen fibrous material comprises immersing same in solution, of pH 1 to 3, of 1,3-dichloro-5,5-dimethylhydantoin, liquid of solution consisting of water. No. 2,414,704. Maurice Ward to E. I. du Pont de Nemours & Co.

Process comprises wetting, with aqueous medium, yarn comprising regenerated cellulose filaments having permanent crimp, drying yarn under tension to remove crimp, constructing fabric with yarn, causing filaments to crimp spontaneously, in situ, in fabric by wetting and drying without tension. No. 2,414,800. William Charch and William Underwood to E. I. du Pont de Nemours & Co.

Water-soluble, silicon-containing compound rendering textile fibers water-repellent when deposited and decomposed by heat which is product of reaction at 90° C. of tertiary amine with reaction product of mixture of formaldehyde, silicon halide, and fatty acid amide. No. 2,415,017. Charles MacKenzie to Montclair Research Corp.

Making tire fabric. No. 2,415,023. Charles Novotny to The Firestone Tire & Rubber Co.

\* U. S. Patents from Vol. 594, Nos. 2, 3, 4, Vol. 595, No. 1. Canadian from Feb. 25—March 18, 1947.

Treatment of textile materials having basis of cellulose acetate to render same flame-proof, fire-proof and drip proof, comprises applying to textile material solution in aqueous solvent medium comprising 5 to 25% of ammonium bromide and 5 to 30% of urea, removing water. No. 2,415,112. George Seymour and George Ward to Celanese Corp. of America.

Flameproof textile materials containing cellulose acetate which drip away rapidly when melted by contact with open flame, characterized by having present thereon 5 to 20% of thiourea, 5 to 20% diammonium alkyl phosphate and 2 to 20% of ammonium salt. No. 2,415,113. George Seymour and George Ward to Celanese Corp. of America.

Production of differential dyeing effects on cellulosic textile fabrics, comprises uniformly impregnating fabric with liquid composition containing nitrogenous resin-forming compounds, etc. No. 2,415,320. Croyden Whittaker, Henry Thomas, Clifford Wilcock and Charles Tattersfield to Courtaulds, Ltd.

#### Canadian

A textile impregnated with 0.001 per cent to 3 per cent of a higher alkyl benzotriazolium salt having at least one aliphatic radical of at least 8 carbon atoms. No. 439,923. The Richards Chemical Works (Adrien S. DuBois and Emeric I. Valko).

Washing white textile materials in an aqueous bath containing a detergent and a very small proportion of blue fluorescent substance which is substantive to the fibers of the materials. No. 440,021. Lever Brothers & Unilever, Ltd. (Richard Thomas).

#### \*Water, Sewage and Sanitation

Treating waste liquor from manufacture of viscose rayon containing sulfides and polysulfides comprising adding acid to waste liquor to reduce pH within range of 8 to 10, subjecting waste liquor to action of micro organisms which occur in sludge thereby oxidizing sulfides and polysulfides to stable sulfur compounds. No. 2,414,930. Benjamin Collins and Edmond Roetman to American Viscose Corp.

Equipment for aerating and circulating sewage. No. 2,415,048. William Sharp.

#### Agricultural

Producing ammoniated superphosphate fertilizer, whereby reversion to citrate-insoluble form is prevented. No. 2,415,464. Eugene D. Crittenden to The Solvay Process Company.

Production of fertilizer containing active and available insoluble nitrogen. No. 2,415,705. Leonard V. Rohner and Alvin P. Wood to The Solvay Process Co.

Treating seeds before planting for stimulating growth of plants comprises treating seeds with formula described in patent. No. 2,416,198. Wendell W. Moyer to A. E. Staley Mfg. Co.

Maturing cotton to cause opening of cotton bolls includes applying to foliage after crop has been made, phytotoxic substance selected from pentachlorophenol and its salts. No. 2,416,259. John Franklin Kagy and David T. Prendergast to The Dow Chemical Co.

#### Canadian

Ammonium nitrate pebbling process. No. 440,809. The Solvay Process Company (Richard C. Datin).

Seed immunizing composition comprising a finely divided solid mixture of sulphur nitride, imino sulphur, with an inert powder. No. 440,885. Canadian Industries, Ltd. (Owen Bevan Lean and Percy Wragg Brian).

#### Cellulose

Clarifying liquids, by adding to liquid neutral aqueous suspension of lignin free of cellulose. No. 2,415,439. Wyly Dewey Nelson.

Forming cellulose sol comprises subjecting cellulose to acid dichromate solution to degrade cellulose, washing, drying, saturating with sodium zincate macerating saturated oxycellulose, diluting macerated mass. No. 2,416,998. Frank C. Hewitt and Charles Roy Cayen to The Aspinook Corporation.

#### Ceramics

Beryllium boro-phosphate optical glass. No. 2,415,661. Kuan-Han Sun and Maurice L. Huggins to Eastman Kodak Co.

Low reflection glass. No. 2,415,703. Frederick H. Nicoll to Radio Corp. of America.

Infrared transmitting glass contains silica, alkali metal oxide, at least 2% of zinc oxide and coloring materials consisting of Se, CdS and CoO. No. 2,416,392. Harrison P. Hood to Corning Glass Works.

Heat cast refractory containing magnesium spinel composed of zirconia, magnesia and alumina in which zirconia is between 10% and 60% magnesia is over 7% and ratio of alumina to magnesia is over 2.5 by weight. No. 2,416,472. Theodore Estes Field to Corhart Refractories Co.

Refractory concrete comprising calcium aluminate cement 5 to 60% weight of mix and topaz containing 1% by weight of fluorine, .5 to 95% by weight of mix. No. 2,416,700; No. 2,416,701. Daniel W. Kocher to Universal Atlas Cement Company.

#### Canadian

Rigid thermal insulating material consisting of mineral wool, betonite, diatomite and expanded perlite. No. 440,385. Canadian Gypsum Co., Ltd. (United States Gypsum Co., Bradford R. Minnis and Clyde C. Schuetz).

Stable dry composition capable, upon the addition of water, of setting to a synthetic stone, comprising 40 to 80 per cent of a solid water insoluble inert material 10 to 35 per cent of an alkaline acid phosphate, 10 to 35 per cent of dead burned magnesite, and 0.5 to 5 per cent of a water soluble alkaline fluoride. No. 440,567. Titanium Alloy Mfg. Co. (Eugene Wainer and Allen N. Solomon).

Glass composition suitable for sealing iron. No. 440,881. Canadian General Electric Company, Ltd. (Raymond W. Goodwin).

Composition for application to provide a refractory. No. 440,900. Canadian Westinghouse Company, Ltd. (Howard M. Elsey).

\* U. S. Patents from Vol. 594, Nos. 2, 3, 4, Vol. 595, No. 1.

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## Coatings

Coating metallic surface formed of metal from group consisting of zinc and cadmium comprises electrochemically depositing on surface from solution of copper salt and chloride from group consisting of alkali-metal chlorates and alkali-earth-metal chlorates coating primarily of copper compound, treating deposit in hydrogen-peroxide solution. No. 2,415,651. Howard Nechamkin to Hazeltine Research, Inc.

Preparing improved asphalt coating composition comprises dissolving in naphtha solvent blend of air-blown asphalt and resinous distillation residue obtained from distillation furfural extract of lubricating oil distillate fraction. No. 2,415,697. Edwin C. Knowles and Frederic C. McCoy to The Texas Co.

Plating chromium on surface composed of nickel comprises, subjecting surface to non-electrolytic action of solution containing chromic acid as oxidizing agent and acid radical of strong acid to prepare metal surface for plating chromium thereon, etc. No. 2,415,724. Frank H. Beall.

Forming resilient friction material for brake lining consists in combining sulphur with previously sulphurized linseed oil, adding first mixture to second mixture of mica, iron oxide, clay, coke and asbestos fibres to form third mixture, heating third mixture in oven at temperature not over 250°F. No. 2,415,752. William Nanfeldt to World Bestos Corp.

Relatively hard, rigid and non-deformable resinous laminate, capable of withstanding temperatures in excess of 300°F. and of receiving baked-on enamel coating without blistering or delamination. No. 2,415,763. Patrick P. Ryan to St. Regis Paper Co.

Coating composition comprising crystallizing solution consisting of 32 pounds of crystallizing substance selected from acetanilide, phthalic acid, salicylic acid and saliformin dissolved in 48 to 77 gallons of solvent and 56 pounds of chlorinated rubber. No. 2,415,775. William Allshire Waldie to Chemical Developments Corp.

Making varnish comprises heating castor oil between 220° and 350°C. with between 0.005% and 0.2% of heteropoly acidic compound of tungsten until castor oil is dehydrated and heat-bodied adding polyhydric alcohol heating to cause polyhydric alcohol to react and esterifying residual hydroxyl groups with natural resin acid. No. 2,415,969. Alfred E. Rheineck and Samuel B. Creelious to Devco & Reynolds Co., Inc.

Step in preparing initial, fusible, soluble, furfuryl alcohol resinous condensation product comprises adding to furfuryl alcohol, active acid catalyst in furfural, furfural not exceeding 15% based on weight of furfuryl alcohol. No. 2,416,038. William H. Adams, Jr., to Haveg Corp.

De-icing paint comprising water insoluble vehicle dissolved in volatile organic solvent, water freeze point depressant salt, wetting agent selected from salts of sulphated acids, salts of sulphonated acids, etc. No. 2,416,103. Glen T. Lampton and Howard L. Vashinder and Theodore A. Dissel to United Aircraft Corp.

Bituminous emulsion of water-in-oil type for all-purpose coating for mineral aggregate including liquefied bitumen, aliphatic amine, water insoluble fatty acid soap in colloidal state. No. 2,416,134. William W. Allen to West Bank Oil Terminal, Inc.

Hydrous alkaline printing paste comprising azo dye coupling component devoid of solubilizing groups; thickener; and a diazoamino compound of benzene series. No. 2,416,187. Carl W. Maynard, Jr., and Emil G. Wiest to E. I. du Pont de Nemours & Co.

Decalcomanias, method of rendering inner face non-specular comprises incorporating in coating finely divided particles insoluble in water and in ink vehicle of transfer, large enough to roughen coating, drying coating. No. 2,416,673. Benjamin Asnes to Dennison Manufacturing Company.

Printing ink vehicle oxidizing type, normally contains drying oil as major constituent, tall oil reacted with hydrated lime, inks characterized by drying speed and printability approximating inks in which lined tall oil is replaced by linseed oil. No. 2,416,676. Dominic J. Bernardi and Robert T. Florence to Interchemical Corporation.

Article having ferrous surface to render corrosion-resistant and subsequently coat, thin film superposed on ferrous surface comprising completely hydrolyzed lanolin of thickness obtained by dipping article in 1 to 10% solution of material in xylene and allowing to drain and dry. No. 2,417,028. Franklin B. Wells to Ellis-Foster Company.

## Canadian

Producing a modified alkyd resin by heating a mixture of a polymerized rosin, maleic anhydride and a polyhydric alcohol at a temperature of 200°C. to 300°C. No. 440,528. Hercules Powder Company (Ernest Gustaf Peterson).

Printing ink comprising pigment in a resin, liquid polyglycol vehicle and monoterpinyl ethylene glycol ether. No. 440,671. Fred'k H. Levey Company, Inc. (John W. Kroeger and Daniel J. O'Connor, Jr.)

## Dyes, Pigments

Reddish-orange vat dyes of anthraquinone oxazole series which have formula described in patent. No. 2,415,938. Joseph Deinert to E. I. du Pont de Nemours & Co.

Treating zinc oxides. No. 2,416,044. John Henry Calbeck to American Zinc, Lead and Smelting Co.

Black pigment composition, calcined reaction product of finely-divided mixture of chromite ore and alkaline earth compound. No. 2,416,064. Gordon Derby Patterson and Clifford Kanne Sloan to E. I. du Pont de Nemours & Co.

Method producing iron oxide for pigment purposes. No. 2,416,138. Joseph W. Ayers to C. K. Williams & Co.

Metal complexes of azo dyes and process of production. No. 2,416,248. Harold E. Woodward to E. I. du Pont de Nemours & Co.

Treating sulfide-containing pigment to improve its hiding power, to increase its resistance to settling and to increase its resistance to discoloration in presence of lead driers, comprising preparing aqueous slurry pigment; adding water-soluble alkali slurry to establish pH of at least 8, introducing water-soluble borate into slurry, etc. No. 2,416,325. Otto C. Keln to The Glidden Co.

Improving resistance to fume fading of colorations on materials comprised of cellulosic compounds from cellulose esters and cellulose ethers comprises incorporating in materials N,N'-diphenylethylene diamine. No. 2,416,380. Benjamin Collicie, Charles Hugh Giles and Donald Graham Wilkinson to Imperial Chemical Industries, Ltd.

Printing paste for printing with chrome mordant dyestuff, consists of intimate admixture of solution of chrome mordant dyestuff in minimum amount of water necessary for complete dissolution aliphatic polyalcohol, urea, thickener selected from cellulose ester and cellulose ether thickeners, salt of chromic acid, agent which splits off acid in heat. No. 2,416,382. Georges de Niederhausen & Ernst Tschan to Swiss firm of Durand & Huguénin A. G.

Manufacture of sulphur containing dyestuffs of the phthalocyanine series, comprises heating, at 120°C., phthalocyanine compound selected from metal- and metal-free phthalocyanines containing sulphonyl-chloride groups, with organic mercaptan which is liquid at reaction

temperature. No. 2,416,386. Norman Hulton Haddock and Clifford Wood to Imperial Chemical Industries Limited.

Manufacture of sulphur-containing dyestuffs comprising heating member selected from metal and metal-free phthalocyanine sulphonyl chlorides with thioamide having at least one free hydrogen atom attached to nitrogen atom of thioamide radical. No. 2,416,387. Norman Hulton Haddock and Clifford Wood to Imperial Chemical Industries Limited.

Direct azo dyes containing 3,5 dihydroxy benzoylamino groups. No. 2,416,547. Swanie S. Rossander, Chiles E. Sparks and James W. Libby, Jr. to E. I. du Pont de Nemours & Co.

Azo Printing Composition. No. 2,416,549. Francis G. Smith, Chiles E. Sparks to E. I. du Pont de Nemours & Co.

Luminescent material consisting of fired mixture of calcium phosphate and potassium chloride, thallium-activated, potassium chloride being between 25% and 50% of composition by weight. No. 2,417,038. Richard H. Clapp to Sylvania Electric Products, Inc.

## Canadian

Method of preparing zinc sulphide for use in a phosphorescent screen. No. 440,386 Canadian Kodak Co., Ltd. (Charles L. Graham and Herbert J. Dietz).

Continuous process of producing carbon black. No. 440,546. Philips Petroleum Company (Joseph C. Krejci).

Apparatus for producing carbon black. No. 440,547. Philips Petroleum Company (Joseph C. Krejci).

Process of making carbon black of increased yield from hydrocarbon gas mixtures. No. 440,548 Philips Petroleum Company (Joseph C. Krejci).

Phosphor comprising zinc oxide and an activator of bismuth sulphate, the fluorescent-responsiveness of which has been induced by heat treatment in the presence of hydrogen. No. 440,640. Canadian General Electric Company, Ltd. (Clifford A. Nickle).

Phosphor of strontium zirconate activated with a minor proportion of bismuth. No. 440,878. Canadian General Electric Company, Ltd. (Herman C. Froelich).

Phosphor comprising a matrix of cadmium orthoborate activated with manganese and co-operating activator material of the group comprising bismuth and tin. No. 440,879. Canadian General Electric Company, Ltd. (Wayne O. Graff).

## Equipment

Apparatus for measuring a liquid comprising pump unit having supply conduit to be connected with source of supply of liquid medium and discharge conduit for conveying measured amount of medium to point of use. No. 2,415,419. Frank J. Cozzoli.

Apparatus for removing fumes that are locally generated by industrial units, comprising floor-like support adjacent to such unit and provided with fume conduit having horizontally disposed orifice, removable hood above orifice having bottom wall with fume discharging opening registering therewith and having fume-receiving opening at one of its sides, etc. No. 2,415,471. Morton I. Dorfman.

Electrode for fused salt bath electrical furnace comprising hollow tubular conductor of electricity having openings in side wall adapted to be submerged vertically in salt bath. No. 2,415,494. Artemas F. Holden.

In desiccating apparatus desiccating chamber, atomizing means in upper portion of chamber, means for introducing hot drying gas into chamber in region adjacent atomizing means, discharge means connected to chamber. No. 2,415,527. David D. Peebles to Golden State Company, Ltd.

Solution forming device comprising container having piston movable therein and dividing container in to separate compartments, pipe for connecting one of compartments with source of water under pressure, pipe for connecting said one of compartments with discharge outlet, single valve means for simultaneously opening one of pipes and closing other, etc. No. 2,415,534. Edward J. Ries and Lennart H. Brune to Ritter Company, Inc.

Non-sputtering electrode for mercury arc devices. No. 2,415,548. Leonard M. Wittlinger to General Motors Corp.

Electrochemical scale remover and scale and corrosion preventer. No. 2,415,576. Ual J. Brown.

In combination in battery having casing, positive and negative plates in casing, separating device for separating plates, absorbent material surrounding plates for absorbing liquid electrolyte, etc. No. 2,415,593. Gerald W. James to Ideal Industries, Inc.

Replaceable cell-storage battery. No. 2,415,694. Robert C. Isabell and James Sawdon.

Endless conveyor drier structure. No. 2,415,738. Berthold G. Freund.

Apparatus for stirring contents of sealed cylindrical cans in transit. No. 2,415,782. Erich R. Zadernach, William W. Clarke and Karl L. Ford to Metalwash Machinery Co.

Portable vulcanizing kit, comprising carrying case, end compartment open along sloping plane, complementary body members mounted in end compartment to provide vulcanizing chamber, etc. No. 2,415,959. James B. Miller to Mines Equipment Co.

Gas pressure reducer comprising housing member with entrance opening formed in side, exit opening formed in end, choke including bore to conduct high pressure gas within housing and tubular shell extending from choke. No. 2,415,992. Louis C. Clair.

Storage battery. No. 2,416,651. John R. Smyth to Willard Storage Battery Co.

Impregnating fine carbon particles into continuous sheet of filter material having variable resistance to flow of air, to have constant resistance to air flow through impregnated sheet, comprising moving filter material through stream of gas laden with fine carbon particles. No. 2,416,695. Stuart M. Jessop and Harry E. Dyer.

Battery having casing, positive and negative plates, absorbent material surrounding plates for absorbing liquid electrolyte, cover for casing. No. 2,416,755. Gerald W. James to Ideal Industries, Inc.

Apparatus for measuring density of liquids. No. 2,416,808. Oscar Weiss.

Measuring and dispensing device for inverted open mouth container. No. 2,416,811. Theodore Bailey.

Cell for measuring pH of solution containing molecular oxygen and free of molecular hydrogen comprising non-porous iridium measuring electrode, uncontaminated by occluded hydrogen, and whose voltage/pH is reproducible and approximates oxygen electrode. No. 2,416,949. George A. Perley and James B. Godshalk to Leeds and Northrup Company.

## Explosives

Explosive coupler unit for blasting column assembly. No. 2,415,422. Robert E. Fogg to E. I. du Pont de Nemours & Co.

Compound detonator comprising main charge of nitro-compound, priming charge of lead azide, and igniter charge of antimony sulphide, potassium chlorate and lead azide. No. 2,415,806. Clarence J. Bain and Leroy R. Carl.

Additional patents from the above volumes will be given next month.

# Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

427,612. American Cyanamid Company, New York, N. Y.; filed Oct. 24, 1945; serial No. 490,413; for synthetic finishing resins; since Oct. 9, 1945.

427,918. R. E. Carroll, Inc., Trenton, N. J.; filed Mar. 6, 1946; serial No. 497,700; for ground limestone; since July 1934.

473,604. June & Co., Detroit, Mich.; filed Aug. 25, 1944; for rust preventative; since July 14, 1944.

483,903. Industrials Del Mangle, S. A. Bogota and Buenaventura, Colombia; filed May 29, 1945; for spray dried powdered mangrove extract for tanning; since Aug. 23, 1944.

486,092. Enoz Chemical Co., Chicago, Ill.; filed July 21, 1945; for insecticides; since June 19, 1934.

488,508. Columbia Ribbon and Carbon Manufacturing Company, Inc., Glen Cove, N. Y.; filed Sept. 15, 1945; for ink repellent fluids, lithographic inks; since about June 15, 1945.

489,332. Libbey-Owens-Ford Glass Co., Toledo, Ohio; filed Oct. 3, 1945; for resinous composition; since May 31, 1939.

491,385. Bee Chemical Company, Chicago, Ill.; filed Nov. 10, 1945; for non-paint corrosion protective coatings; since September 1945.

491,545. A. D. Chapman & Co., Inc., Chicago, Ill.; filed Nov. 14, 1945; for primer, sealer, finishing coat for wood products; since Sept. 14, 1945.

492,564. Knox Chemical Company, Chicago, Ill.; filed Dec. 3, 1945; for non-saponaceous and non-detergent liquid degreasing chemical; since Sept. 15, 1944.

494,742. Herbert W. Faus, New York, N. Y.; filed Jan. 14, 1946; for heat-evaporative chemical smoke; since Dec. 1, 1945.

496,139. Herbert J. Heribert, New York, N. Y.; filed Feb. 7, 1946; for printing ink and printing lacquer, for use on plastic; since Jan. 24, 1946.

496,886. Commanditaire Vennootschap Chemische Fabriek Rids. Ijmuiden, Holland; filed Feb. 19, 1946; for deodorizing air, bodies, destroying insects; since Sept. 5, 1939.

497,181. Industrial Adhesives, Inc., Cincinnati, Ohio; filed Feb. 25, 1946; for adhesives, cements, bonding agents; since Feb. 1, 1946.

497,409. Phillips Petroleum Co., Bartlesville, Okla.; filed Feb. 28, 1946; for naphthas; since Feb. 9, 1946.

497,884. Socony-Vacuum Oil Co., Inc., New York, N. Y.; filed Mar. 8, 1946; for cleaning machinery; since Feb. 6, 1946.

499,443. St. Lawrence Chemical Co., Inc., Ogdensburg, N. Y.; filed April 1, 1946; for wettable dispersing insecticide powder; since Jan. 8, 1946.

499,677. Vita Var Corporation, Newark, N. J.; filed April 4, 1946; for paint enamel; since Feb. 14, 1946.

499,814. American Handicrafts Company California, Los Angeles, Calif.; filed Apr. 8, 1946; for polysoluble leather dye; since Jan. 30, 1946.

499,938. Applied Chemical Corp., New York, N. Y.; filed Apr. 10, 1946; for aluminum acetate; since Jan. 25, 1946.

500,077. The B. F. Goodrich Co., Akron, Ohio; filed Apr. 12, 1946; for controlling vulcanization rubber; since about March 13, 1946.

500,846. United States Rubber Company, New York, N. Y.; filed April 24, 1946; for fungicides; since Dec. 15, 1945.

500,847. United States Rubber Co., New York, N. Y.; filed Apr. 24, 1946; for insecticides; since Mar. 7, 1946.

500,907. Phil L. Siteman, as The Cylube Co., St. Louis, Mo.; filed Apr. 25, 1946; for compositions to be added to gasoline and lubricating oils for removal of carbon, gum, sludge from engine surfaces; since Mar. 15, 1946.

500,929. Armour & Co., Chicago, Ill.; filed Apr. 26, 1946; for high melting point, high molecular weight organic chemicals derived from carboxylic acids; since February 1945.

500,930. Armour and Company, Chicago, Ill.; filed Apr. 26, 1946; for high molecular weight nitrile products derived from carboxylic acids; since Mar. 1, 1946.

500,931. Armour and Company, Chicago, Ill.; filed April 26, 1946; for ammonium compounds; since Jan. 30, 1946.

501,523. Monsanto Chemical Co., St. Louis, Mo.; filed May 6, 1946; for chemicals having fungicidal and preservative properties for textiles; since about Mar. 19, 1946.

501,899. Calgon, Inc., Pittsburgh, Pa.; filed May 11, 1946; for detergent; since Jan. 3, 1945.

503,118. The Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.; filed May 31, 1946; for acids for industrial use; since Aug. 24, 1945.

503,129. Protective Coatings Corp., Belleville, N. J.; filed May 31, 1946; for moisture-proof, treated paper; since May 18, 1946.

503,584. Michigan Chemical Corp., St. Louis, Mich.; filed June 10, 1946; for killing weeds; since Mar. 27, 1946.

503,852. Jacques Wolf & Co., Clifton, N. J.; filed June 13, 1946; for mixture of sodium formaldehyde sulfoxylate and leucotrope w. for white discharge on indigo dyed goods; since January 1919.

503,853. Jacques Wolf & Co., Clifton, N. J.; filed June 13, 1946; for sulphonated oil with solvents as scouring agent for synthetic and natural fibres; since April, 1922.

503,854. Jacques Wolf & Co., Clifton, N. J.; filed June 13, 1946; for mixture of vinylite compounds and higher polyalcohols used in mercerization of cotton; since Jan. 15, 1946.

504,478. Thomas H. Donahue, as Donahue Manufacturing Co., Los Angeles, Calif.; filed June 24, 1946; for insecticide; since Feb. 25, 1946.

504,649. The Visking Corporation, Chicago, Ill.; filed June 26, 1946; for monofilaments of vinyl resins, and polymeric vinylidene chloride and copolymers; since May 14, 1946.

504,823. The Cowles Detergent Co., Cleveland, Ohio; filed June 29, 1946; for metal descaling preparation; since May 29, 1946.

507,868. United States Mineral Wool Co., Chicago, Ill.; filed Aug. 22, 1946; for thermal insulating material; since Aug. 3, 1946.

509,346. Kinetic Chemicals, Inc., Wilmington, Del.; filed Sept. 19, 1946; for trifluoromethane or fluoroform, refrigerants propellants, fire extinguishing preparations; since Dec. 13, 1945.

509,347. Kinetic Chemicals, Inc., Wilmington, Del.; filed Sept. 19, 1946; for carbon tetrafluoride, refrigerant, propellant, fire extinguishing preparation; since Feb. 13, 1946.

509,348. Kinetic Chemicals, Inc., Wilmington, Del.; filed Sept. 19, 1946; for trifluoromethane or fluoroform; since Dec. 13, 1945.

509,814. Atlas Latex Co., Clifton, N. J.; filed Sept. 27, 1946; for rubber cement; since Aug. 1, 1946.

512,009. Mallinckrodt Chemical Works, St. Louis, Mo.; filed Nov. 4, 1946; for silica gel; since Aug. 7, 1946.

514,797. The Brunswick-Balke-Collender Company, Chicago, Ill.; filed Dec. 26, 1946; for rubber cement; since Oct. 19, 1946.

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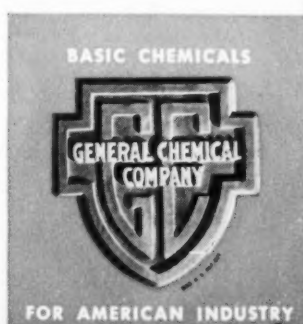
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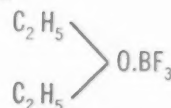
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Formula:



**Molecular Weight:** 141.9

**Melting Point:** Less than  $-60^\circ\text{C}$

**Boiling Point:**  $125^\circ\text{C}$

**Specific Gravity:** 1.14 at  $25^\circ\text{C}$

**%  $\text{BF}_3$ :** 47.8% min.

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1. Polymerization of unsaturated compounds such as olefins, diolefins, vinyl ethers, fatty oils, and terpenes. The products may be solid polymers useful as plastics or liquids as in the bodying of drying oils for paints and varnishes.
2. Condensation of aromatic nuclei with olefins and diolefins, paraffins and olefins, and aromatic nuclei or olefins with acids.
3. As a cyclizing agent for rubber.
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